

BEFORE THE
CONNECTICUT PUBLIC UTILITIES REGULATORY AUTHORITY

APPLICATION OF
AQUARION WATER COMPANY OF CONNECTICUT
FOR ADJUSTMENT OF RATES AND CHARGES

DOCKET NO. 25-12-12

DIRECT TESTIMONY
OF
AARON L. ROTHSCILD

COST OF CAPITAL

ON BEHALF OF THE
CONNECTICUT PUBLIC REGULATORY AUTHORITY OFFICE OF EDUCATION,
OUTREACH, AND ENFORCEMENT

JUNE 10, 2026

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I. STATEMENT OF QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Aaron L. Rothschild. My title is President, and my business address is 15 Lake Road, Ridgefield, CT.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am President of Rothschild Financial Consulting (“RFC”).

Q. PLEASE STATE YOUR EDUCATIONAL ACHIEVEMENTS AND PROFESSIONAL DESIGNATIONS.

A. I have a B.A. degree in mathematics from Clark University (1994) and an M.B.A. from Vanderbilt University (1996).

Q. PLEASE DESCRIBE YOUR BUSINESS EXPERIENCE.

A. I performed financial analysis in the telecom industry in the United States and Asia Pacific from 1996 to 2001, investment banking consulting in New York, complex systems science research regarding the power sector at an independent research institute, and I have prepared rate of return testimonies since 2002. See Appendix H for my resume.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE CONNECTICUT PUBLIC UTILITIES REGULATORY AUTHORITY, OR OTHER STATE COMMISSIONS? IF SO, WHICH COMMISSIONS?

A. Yes. I have testified before the Connecticut Public Utilities Regulatory Authority.

1 My expert witness experience also includes testifying in over 100 cost of capital
2 proceedings before the following additional state commissions: California, Colorado,
3 Connecticut, Delaware, District of Columbia, Florida, New Hampshire, New Jersey, New
4 York, Maryland, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee,
5 and Vermont.

6 **Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?**

7 **A.** I am testifying on behalf of the Connecticut Public Regulatory Authority Office of
8 Education, Outreach, and Enforcement (“EOE”).

9 **II. INTRODUCTION**

10 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS**
11 **PROCEEDING?**

12 **A.** The purpose of my testimony is to address the cost of capital for Aquarion Water Company
13 of Connecticut (“Aquarion” or the “Company”) which includes the following three
14 components:

- 15 1. **Cost of Equity (“COE”):** The return investors require to provide equity capital to a
16 utility with Aquarion’s specific risk profile.
- 17 2. **Cost of Debt:** The prevailing market interest rates and terms associated with the
18 Company's debt obligations.
- 19 3. **Capital Structure:** The relative proportions of equity and debt used to fund the
20 Company’s operations.

1 Based on my analysis of these cost of capital components, I recommend an allowed
2 rate of return (“ROR”) for ratemaking purposes, including an appropriate authorized return
3 on equity (“ROE”), authorized cost of debt, and authorized capital structure. Please see
4 Appendix A for a more detailed definition and discussion of these specific components.

5 **Q. PLEASE DEFINE THE COE, COST OF DEBT, AND CAPITAL STRUCTURE.**

6 **A.**

7 1. **COE:** My COE recommendation is my opinion of the return investors require to
8 provide equity capital to Aquarion based on current capital markets. Since investors
9 must pay the market price of a stock to make an investment, investors’ required returns
10 are based on the return they expect to receive on the market price of stocks. In other
11 words, Aquarion’s COE is forward-looking and “market-based.” My recommendation
12 is consistent with the following legal standards set by the United States Supreme Court
13 for a fair rate of return:

14 The return to the equity owner should be commensurate with returns on
15 investments in other enterprises having corresponding risks.¹

16 And

17 [S]ufficient to . . . support its credit and . . . raise the money necessary for
18 the proper discharge of its public duties.²

19 2. **Cost of Debt:** My cost of debt recommendation is based on the actual cost of debt
20 paid by the utility to its sources of credit. For example, if a utility has issued a bond
21 with a 3% interest rate three years ago, its authorized cost of debt should be 3%, even
22 if interest rates are currently higher or lower than 3%.

¹ *Fed. Power Comm’n v. Hope Nat. Gas Co.*, 320 U.S. 591, 603 (1944).

² *Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm’n of the State of W. Va.* 262 U.S. 679, 692-693 (1923).

1 **3. Capital Structure:** Capital structure is the percentage of equity and debt that makes
2 up the finances of a utility. For example, if a utility raises \$1 million of equity capital
3 and \$1 million of debt capital, we say it has a capital structure containing 50% equity
4 and 50% debt. The utility has the burden of proof to demonstrate that its requested
5 capital structure for regulatory purposes produces the lowest, reasonable overall cost
6 of capital. My capital structure recommendation is based on my review of Aquarion's
7 justification for its requested regulatory capital structure and the capital structure ratios
8 of other gas and water utility companies. As discussed below, the reported capital
9 structure of a regulated subsidiary is often not representative of how the regulated
10 utility was financed. For example, the parent of a regulated utility can report funds
11 raised through debt financing at the holding company level as equity financing on the
12 books of its regulated utility subsidiary. Therefore, it is important to make sure Mr.
13 Nowak's recommended capital structure would not overcharge consumers by
14 including a higher common equity ratio than is appropriate.³

15 **Q. WHAT IS THE DIFFERENCE BETWEEN AQUARION'S COST OF EQUITY**
16 **AND ITS AUTHORIZED ROE?**

17 **A.** The COE is the market-based return investors require to invest in any given stock. In other
18 words, it is the return necessary to attract equity capital in a competitive market. In this
19 proceeding, Aquarion's COE is estimated using cost of equity models, which rely on
20 capital market data from a proxy group of publicly traded gas utility companies to measure
21 investor return expectations and the returns they require to purchase a stock, as Aquarion

³ A higher common equity ratio, all else equal, results in higher rates for consumers because equity is more expensive than debt.

1 itself is not publicly traded. While the COE is often discussed in terms of investor
2 expectations, it is fundamentally a required return—what investors demand to provide
3 equity capital.

4 The appropriate authorized ROE is determined by PURA based on its assessment
5 of the COE at the time of the proceeding, after reviewing the evidentiary record, which
6 incorporates investor expectations. Once PURA issues an authorized ROE, the market-
7 based cost of equity will continue to fluctuate as capital markets evolve. The authorized
8 ROE, therefore, represents a snapshot of the COE at a specific point in time, even though
9 the COE itself is continuously changing.

10 **Q. PLEASE DEFINE THE APPROPRIATE RATE OF RETURN.**

11 **A.** The appropriate Rate of Return (ROR) is based upon the weighted overall cost of capital
12 (WACC) of the current costs of debt and equity at the time of this proceeding. The
13 weighted cost rate is calculated by multiplying the capital structure ratios of the sources of
14 capital (debt, preferred equity, and common equity) times their respective cost rates.

15
$$\text{WACC} = \text{Cost of Debt} \times \text{Debt Ratio} + \text{COE} \times \text{Common Equity Ratio} + \text{Cost of}$$

16 Preferred Equity $\times$ Preferred Equity Ratio.

17 **Q. HOW DO YOU DEFINE YOUR ROLE IN PROVIDING THIS ANALYSIS?**

18 **A.** My role is to provide a recommendation based on an objective analysis of the Cost of
19 Capital. While I define this fundamentally as the return investors require in exchange for
20 providing funds to a utility with Aquarion's specific risk profile, my analysis also provides
21 a broader market context to ensure a principled and durable decision. My approach is
22 grounded in the following framework:

- 1 • **The Commission as the Surrogate for Competition:** Because Aquarion
2 operates as a regulated monopoly, the natural price-disciplining pressures
3 of a competitive market are absent. In this vacuum, the Commission must
4 act as a surrogate for the market. This is a significant and often difficult
5 responsibility. It requires that the "price" of capital charged to ratepayers
6 reflects its market cost, neither providing an unearned monopoly premium⁴
7 nor depriving the utility of the capital it needs to provide essential services.
- 8 • **Acknowledging the Weight of the Decision:** Former Commission Chair
9 Alfred Kahn reminds us in *The Economics of Regulation: Principles and*
10 *Institutions*, the essence of regulation is the replacement of competition.⁵ If
11 the authorized return is disconnected from the actual COE, the result is an
12 involuntary subsidy from ratepayers to shareholders--an outcome that
13 undermines the very purpose of regulation.
- 14 • **Providing an Informed Path Toward Market Alignment:** In this
15 testimony I strive to provide the objective, market-based information that
16 balances utility financial health with ratepayer protection.

17 Importantly, keeping authorized ROEs in line with the market-based cost of equity
18 is not just good for residential consumers; it is pro-business and pro-economy. Small
19 businesses, industrial customers, and commercial enterprises all rely on affordable,

⁴ A "monopoly premium" refers to the excess profits a company can extract simply because consumers have no alternative options. In a competitive market, these excess profits are naturally competed away. For a natural monopoly like Aquarion, granting an authorized ROE that exceeds what investors require in the broader, competitive market allows the utility to capture a monopoly premium, ultimately operating against the public interest.

⁵ Alfred E. Kahn, *The Economics of Regulation: Principles and Institutions* at 20 (MIT Press 1988).

1 predictable water costs to compete and grow. Furthermore, lower utility bills mean that
2 residential consumers retain more of their income to spend on other goods and services.
3 This local spending directly stimulates the Connecticut economy, whereas excess utility
4 profits are largely extracted and distributed to global investors outside of the state. Aligning
5 Aquarion's authorized ROE with its cost of equity helps businesses manage their costs,
6 which strengthens the state's overall economy.

7 **Q. HOW IS YOUR TESTIMONY ORGANIZED?**

8 **A.** First, I provide a summary of our recommendations and an overview of COE concepts.
9 Second, I provide my capital structure and cost of debt recommendation. Third, I provide
10 an explanation of the various models I used in my COE calculations. Fourth, I provide a
11 COE analysis for the overall market as a ceiling for the appropriate ROE for Aquarion.
12 Fifth, I provide an evaluation of Aquarion's rate of return testimony. Lastly, I provide my
13 conclusion.

14 **III. SUMMARY OF RECOMMENDATIONS**

15 **Q. PLEASE PROVIDE A SUMMARY OF YOUR RECOMMENDATIONS.**

16 **A.** I recommend that the Commission reject Mr. Nowak's recommended ROE of 10.20%
17 because it significantly exceeds Aquarion's actual COE as indicated by current market
18 data. Instead, I recommend that the PURA calculate Aquarion's rates based on the
19 following:

- 20 • An overall cost of capital of 6.30% (6.01% - 6.59%);

- An ROE of 8.03% (7.46% - 8.59%)⁶;
- A capital structure containing 50.45% common equity and 49.55% long-term debt; and
- A long-term debt cost rate of 4.54%.

A summary of my cost of capital recommendations for Aquarion's water distribution operations is presented in Table 1 below.

TABLE 1: ALR RECOMMENDED RANGE MIDPOINT - AQUARION WATER COMPANY OF CONNECTICUT Docket No. 25-12-12			
	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	49.55%	4.54%	2.25%
Short-Term Debt	0.00%	0.00%	0.00%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	50.45%	8.03%	4.05%
Rate of Return			6.30%

Exhibit ALR-1

Q. ARE YOU RECOMMENDING A SPECIFIC ROE OF 8.03% OR AN ROE RANGE OF 7.46% TO 8.59%?

A. I recommend both a range of appropriate ROEs and a specific point within that range that I consider to be the most appropriate. It is not possible to measure Aquarion's COE with the precision of measuring temperature with a thermometer. However, my recommended ROE range of 7.46% to 8.59% already eliminates the extreme ends of the results of my models and provides the Commission with a range of ROEs I feel confident will allow Aquarion to raise the capital it needs to provide safe and reliable service. I also recommend a specific point of 8.03% which is at the midpoint of that range.

⁶ As discussed below my ROE recommendation is based on implementing various COE models with a reasonable range of between 7.46% - 8.59%.

1 **Q. PLEASE SUMMARIZE HOW YOU DETERMINED YOUR 8.03% COST OF**
2 **EQUITY RECOMMENDATION FOR AQUARION.**

3 **A.** To arrive at my recommendation, I applied the Constant Growth⁷ and Non-Constant
4 Growth versions of the Discounted Cash Flow (“DCF”) and eight variations of the CAPM
5 methodologies⁸ to a proxy group of regulated utility companies (the same group used by
6 Mr. Nowak). As discussed below, I utilize capital market data and cross-reference the
7 model results of leading financial institutions as an additional check on the reasonableness
8 of my model results.

9 I use a proxy group to calculate Aquarion’s cost of equity because Aquarion does
10 not have publicly traded stock data specific to itself. Additionally, using a proxy group
11 provides more reliable results because it is less likely to be skewed by specific
12 circumstances or anomalies faced by any individual company during the time when I take
13 a snapshot of the COE.

14 As shown in Table 2 on page 10, Cost of Equity Model Results, the results of my
15 cost of equity models, including eight variations of the CAPM and three variations of the
16 DCF, range between 5.95% and 9.27%. Reducing the overall range of my results,⁹ leads

⁷ The constant growth DCF model is a variant, or version, of the single-stage DCF model that uses a consistent, never-changing growth rate component in perpetuity.

⁸ CAPM stands for “Capital Asset Pricing Model.” The CAPM relates return to risk; specifically, it relates the expected return on an investment in a security to the risk of investing in that security.

⁹ While my standard practice often involves the use of the 50th percentile (the median) to mitigate the impact of outliers, the data set in this proceeding exhibited a high degree of dispersion and a significant downward skew. If I had utilized my standard 50th percentile methodology, the resulting cost of equity would calculate to just 6.98%. However, relying on the median in a highly dispersed, downwardly skewed dataset introduces significant estimation risk. Therefore, to mitigate the asymmetric risk of underestimating the true cost of capital during anomalous market conditions, I have narrowed the focus to the upper end of the distribution, selecting the 87th percentile to arrive at 8.03%. This adjustment offsets the downward skew of the underlying data, ensuring the recommended ROE fully satisfies the requirement to attract capital.

me to a reduced Recommended Cost of Equity range of 7.46% to 8.59% (with a recommendation of 8.03%).¹⁰

TABLE 2: COST OF EQUITY MODEL RESULTS		
DCF	Low	High
Constant Growth - Sustainable Growth	9.12%	9.27%
Constant Growth - Option-Implied Growth	6.83%	7.33%
Non-Constant Growth	7.07%	7.28%
CAPM		
Spot (Apr. 30, 2026)		
Risk Free Rate - 3-Month T Bill	5.95%	6.65%
Risk Free Rate - 30-Yr T Bond	6.68%	7.21%
3-Mo. Weighted Average (Feb. to Apr. 2026)		
Risk Free Rate - 3-Month T Bill	6.12%	6.88%
Risk Free Rate - 30-Yr T Bond	6.77%	7.37%
Recommended Range	7.46%	8.59%
Midpoint of Range (Based on Percentiles)	8.03%	

Exhibit ALR-2

To ensure the robustness and real-world applicability of our findings, I validated these COE model results against the long-term capital market expectations of a broad cross-section of the financial community. As I explore in greater detail later in this testimony, this validation includes data from:

- Major financial institutions such as J.P. Morgan and Charles Schwab; and
- Institutional investors, specifically the capital market assumptions of 41 major investment firms and institutional asset managers, including Bank of New York Mellon, BlackRock, and Goldman Sachs Asset Management.

¹⁰ I apply a statistical filtering approach by eliminating the top and bottom 80% of COE model results to reduce the impact of short-term unsustainable market distortions that could overly impact any one of my models.

As shown in Table 3 below, major financial institutions are informing their clients to expect returns on the overall market (S&P 500) of 5.7% to 8.5%.

TABLE 3: U.S. EQUITY RETURN EXPECTATIONS AMONG MAJOR FINANCIAL INSTITUTIONS	
J.P. Morgan Asset Management - Equity Long-Term Returns (2026) [1]	6.7%
Charles Schwab - 10-year U.S. Large Cap Returns (Jan 2026) [2]	5.9%
Horizon Actuarial Services, LLC Survey - 20 Year Horizon (August 2025) [3]	
U.S. Equity - Large Cap (4.8-9.3%, 50% Percentile - 7.1%)	7.1%
U.S. Equity - Small / Mid Cap (4.8-10.0%, 50% Percentile - 7.3%)	7.3%
Aswath Damodaran (May 2026) [4]	8.8%
Duff & Phelps / Kroll (April 2026) [5]	8.5%

Sources:

[1] J.P. Morgan Asset Management - 2026 Long-Term Capital Market Assumptions, 2025, page 12.

<https://am.jpmorgan.com/content/dam/jpm-am-aem/americas/us/en/institutional/insights/portfolio-insights/lcma-full-report.pdf>

[2] Schwab's 2025 Long-Term Capital Market Expectations, January 3, 2025.

<https://www.schwab.com/learn/story/whats-10-year-outlook-major-asset-classes>

[3] Horizon Actuarial Services, LLC, Survey of Capital Market Assumptions Survey, August 2024, page 19.

Survey participants Include: Bank of New York Mellon, BlackRock, Goldman Sachs Asset Management, J.P. Morgan Asset Management, Merrill, Morgan Stanley Wealth Management, Royal Bank of Canada, UBS.

[4] New York University, Professor Aswath Damodaran

<https://pages.stern.nyu.edu/~adamodar/>

[5] Kroll Recommended U.S. ERP and Corresponding RFR to be Used in Computing Cost of Capital: January 2008 - Present,

The fact that market participants, who are responsible for deploying hundreds of billions of dollars in capital, expect returns well below our recommendation of 8.03% provides a high degree of confidence and confirms that a 8.03% ROE is sufficient for Aquarion to attract equity capital.

Q. DO THE LONG-TERM CAPITAL MARKET EXPECTATIONS OF THE FINANCIAL COMMUNITY HIGHLIGHT WHY YOUR ROE RECOMMENDATION AND MR. NOWAK'S ARE SO DIFFERENT?

A. Yes. A primary driver of the discrepancy is Mr. Nowak's reliance on inputs that introduce an upward bias into his market return expectation. Specifically, his Constant Growth DCF model relies on Value Line's projected earnings per share ("EPS") growth rates for the S&P 500 to derive an expected market return, which he calculates at 11.77%.¹¹

¹¹ Mr. Nowak's Direct Testimony, page 34, lines 16-17.

1 While Value Line is an independent subscription service and does not face the exact
2 same investment banking conflicts as traditional "sell-side" analysts, peer-reviewed
3 academic research demonstrates that their long-term growth projections are nonetheless
4 structurally inflated. A comprehensive study published in the *Journal of Banking &*
5 *Finance* found that Value Line's 3- to 5-year projections for earnings and stock returns
6 "exhibit large positive bias". The authors isolated the root of this bias, noting that it appears
7 to be "entirely due to the extreme upward bias in projected profit margins".¹²

8 My goal is to ensure that the cost of equity estimates provided to the Commission
9 are empirically sound and reflective of objective economic reality. The aforementioned
10 study found that Value Line's 3 to 5-year projections lack predictive power, concluding that
11 their "extreme upward bias...calls into question the common practice of using these
12 predictions as proxies for the cost of equity in cost-of-capital studies".¹³ By utilizing these
13 specific projected growth rates, Mr. Nowak's analysis structurally overstates the expected
14 market return.

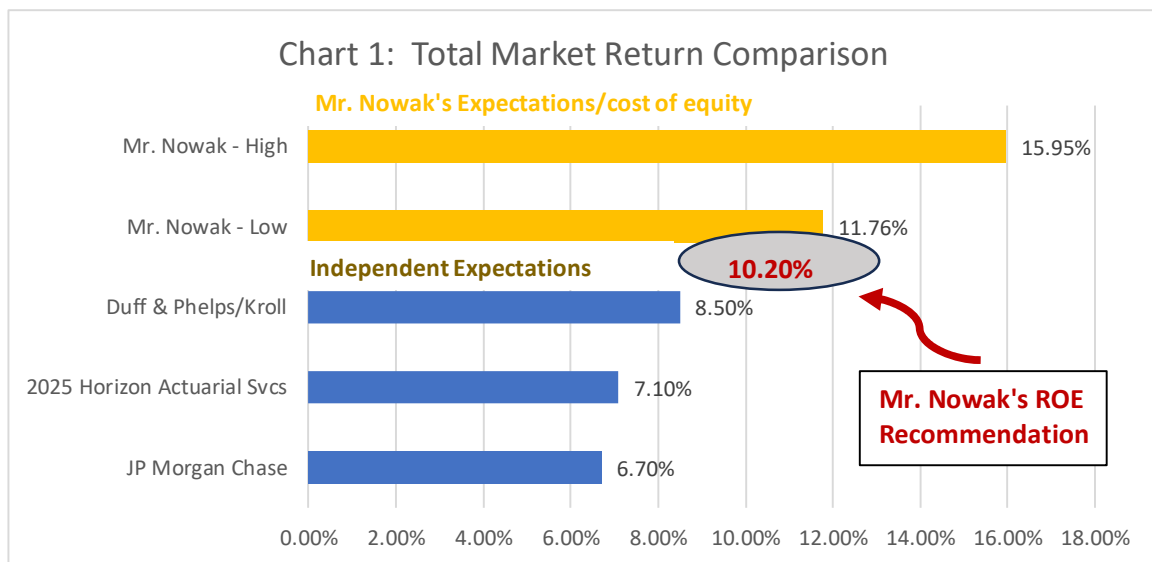
15 Grounding the analysis in broader, observable market data ensures that my
16 recommendation more accurately reflects the actual economic environment. Specifically,
17 my CAPM analysis utilizes an overall market return component of 8.92% to 9.17%¹⁴,
18 which is derived directly from capital market data, including publicly traded stock and
19 stock option prices. This range avoids the well-documented positive bias inherent in Value
20 Line's long-term profit margin and earnings forecasts.

¹²Andrew C. Szakmary, C. Mitchell Conover, & Carol Lancaster, An examination of Value Line's long-term projections, *Journal of Banking & Finance* 32 (2008) 820-833.

¹³ *Ibid.*, at 833.

¹⁴ Exhibit ALR-4, page 4 and Exhibit ALR-4, page 6.

As shown in Chart 1 below, Mr. Nowak's singular reliance on Value Line's EPS growth rates suggests a market return of as high as 15.95%,¹⁵ while broader perspectives and benchmarks from J.P. Morgan¹⁶ (6.7%) and Horizon Actuarial Services¹⁷ (7.1%) point to a reality that is nearly half of what Mr. Nowak proposes.



Q. PLEASE COMPARE AQUARION'S REVENUE REQUIREMENT IF YOUR RECOMMENDATIONS ARE ADOPTED INSTEAD OF MR. NOWAK'S.

A. Based on the \$1,337 million rate base requested by Aquarion in its initial filing, the difference in the revenue requirement is substantial. If my 8.03% cost of equity and capital

¹⁵ Mr. Nowak's Direct Testimony, Exhibit A-8-JCN-6, Page 1 of 14.

¹⁶ J.P. Morgan Asset Management is a global asset management business that annually publishes its Long-Term Capital Market Assumptions to help institutional investors and advisors inform strategic asset allocation. Now in its 30th edition for 2026, this research provides projections that establish reasonable risk and return expectations over a 10- to 15-year time frame across more than 200 asset classes.

¹⁷ Horizon Actuarial Services is an independent consulting firm that provides actuarial services to multiemployer defined benefit pension plans. In its annual Survey of Capital Market Assumptions, now in its 2025 edition, Horizon aggregates future risk and return expectations from 41 different investment advisory firms. This research provides composite forecasts over both 10-year and 20-year horizons to help evaluate the reasonableness of long-term investment return assumptions across various asset classes.

structure recommendations are adopted, the rate of return portion of the revenue requirement would be approximately \$104.2 million.

Conversely, if Mr. Nowak's 10.20% cost of equity and capital structure recommendations are used, the rate of return portion of the annual revenue requirement would rise to \$129.7 million. This represents an annual overcharge to consumers of \$25.6 million. It is important to note that this overcharge impacts all customer classes, not just residential ratepayers.

To provide further perspective on the drivers of this difference, if my recommended 8.03% cost of equity were applied to Mr. Nowak's proposed capital structure, it would result in a \$3.8 million annual revenue impact. This highlights that while the cost of equity is the primary driver, the choice of capital structure also carries significant weight for ratepayers.

I must clarify that these calculations are based specifically on the company's requested rate base as filed. Because the final rate base is subject to the Authority's approval, the absolute dollar impact may vary slightly when final rates are set; however, the relative magnitude of the savings remains consistent regardless of the final rate base determination.

TABLE 4: ANNUAL REVENUE IMPACT VS. ROTHSCHILD RECOMMENDATION - AQUARION WATER COMPANY OF CONNECTICUT (\$ million)		
	Rate of Return Portion of Revenue Requirement	Difference versus Rothschild Recommendation
Rothschild ROE & Cap Structure	\$104.2	
Rothschild ROE with Nowak Cap Structure	\$107.9	\$3.8
Nowak ROE & Cap Structure	\$129.7	\$25.6
Source/Inputs:		
Requested Rate Base [1]		\$1,337.0
Federal income tax rate		21.00%
State income tax rate		7.50%
Uncollectable Expense		0.00%

[1] Witness: D. Szabo, SCHEDULE B-1.0 A

IV. CAPITAL STRUCTURE AND COST OF DEBT

Q. IS AQUARION’S REQUESTED CAPITAL STRUCTURE OF 54.83% COMMON EQUITY AND 45.17% DEBT APPROPRIATE?

A. No. Aquarion’s requested capital structure is not appropriate for setting rates in this proceeding since it has a significantly higher common equity ratio (54.83%) than the consolidated capital structure used at the holding company level for Eversource Energy (38.0%)¹⁸. This requested equity component also exceeds the average common equity ratios observed for the same 11 gas and water utility analyzed by both Mr. Nowak and myself (mean of 50.4% and median of 46.6%).¹⁹

Q. WHAT CAPITAL STRUCTURE DO YOU RECOMMEND BE USED FOR AQUARION’S OVERALL COST OF CAPITAL?

A. I recommend using a capital structure consisting of 50.45% equity and 49.55% debt. This recommendation is conservative and arguably on the high end of what can be justified based on the common equity ratios at the holding company level (49.0%) and the 11 gas and water utility analyzed by both Mr. Nowak and myself (mean of 50.4% and median of 46.6%)²⁰. Absent evidence from Aquarion supporting a specific need for an atypically expensive capital structure, utilizing a ratio that aligns more closely with market benchmarks is consistent with the Commission’s duty to set just and reasonable rates that balance the needs of the utility and its investors with those of the ratepayers.

¹⁸ Eversource Energy Value Line Company Report, May 8, 2026.

¹⁹ Exhibit ALR-5, page 5

²⁰ Exhibit ALR-5, page 5

1 Authorizing a regulatory capital structure for Aquarion with a common equity ratio
2 higher than other comparable utility companies without justification is not reasonable
3 because it will result in excessive rates. A regulated utility company is obligated to use
4 capital that results in the lowest possible cost of capital, and Aquarion's requested structure
5 does not fulfill this obligation.

6 **Q. WHAT IS THE IMPACT OF ADOPTING MR. NOWAK'S RECOMMENDED**
7 **CAPITAL STRUCTURE?**

8 **A.** It can be overlooked that the authorized capital structure can have a large impact on the
9 utility company's revenue requirement.

10 My recommendations, including my capital structure recommendation, result in an
11 overall rate of return of 6.30% as shown in Table 1 on page 8. Mr. Nowak's
12 recommendations result in an overall rate of return of 7.64%. If PURA adopts an equity
13 component of the capital structure ratio that is higher than I have recommended, there
14 should be a corresponding reduction to ROE, which would result in a reduced ROR.

15 If the Company witnesses' capital structure recommendations is adopted it is
16 important to make an adjustment to the overall ROR to account for the financial risk
17 difference between his capital structure recommendation and that of the companies in the
18 Nowak Proxy Group, which have a significantly lower average common equity ratio (mean
19 of 50.4% and median of 46.6%)²¹ than the common equity ratios recommended by Mr.
20 Nowak. A higher common equity ratio means less debt, a lower chance of financial stress
21 (financial risk), and therefore a lower COE. On the other hand, a lower common equity

²¹ Exhibit ALR-5, page 5

1 ratio means more debt, a higher chance of financial stress (financial risk), and therefore a
2 higher COE. Based on a regression analysis of dozens of utility companies, I found a
3 0.04% reduction in the COE results from every 1% increase in the common equity ratio.²²
4 Therefore, if the PURA authorizes a capital structure with a higher common equity ratio
5 for a specific applicant, then the authorized ROE for that applicant should be reduced by
6 0.04% for every 1% its authorized common equity ratio exceeds that of the proxy group.

7 If my 8.03% ROE recommendation is applied to Mr. Nowak's recommended
8 capital structure Aquarion will require a larger revenue requirement of approximately \$3.8
9 million. The difference is even larger when compared to the average common equity ratio
10 of the same 11 gas and water utility companies analyzed by both Mr. Nowak and myself
11 (mean 50.4% of and median of 46.6%).

12 **Q. IS IT REASONABLE FOR MR. NOWAK TO BASE HIS RECOMMENDATIONS**
13 **ON THE AVERAGE COMMON EQUITY AND LONG-TERM DEBT RATIOS**
14 **FOR EACH OF THE PROXY GROUP OPERATING COMPANIES?**

15 **A.** No. Mr. Nowak observes that the mean and median common equity ratios for his proxy
16 group of water and gas operating companies are 46.51% and 60.16%, respectively.²³ While
17 Mr. Nowak relies on these averages at the operating subsidiary level, this approach ignores
18 a fundamental structural reality: a regulated utility subsidiary provides a stable foundation
19 of low-risk cash flows that allows its parent holding company to support debt.

²² Supporting calculations for this analysis are available upon request.

²³ Mr. Nowak's Direct Testimony, page 50, lines 14-18.

1 **Q. WHAT COST OF DEBT DO YOU RECOMMEND?**

2 **A.** I recommend adopting Aquarion’s requested cost of debt of 4.54%.

4 **V. COST OF EQUITY METHODOLOGY**

5 **A. Overview**

6 **Q. PLEASE PROVIDE AN OVERVIEW OF YOUR PERSPECTIVE REGARDING**
7 **HOW CAPITAL MARKETS RELATE TO THE COE AND THE OVERALL COST**
8 **OF CAPITAL.**

9 **A.** The cost of capital is the return investors require to provide capital to Aquarion based on
10 current capital markets. To measure the cost of equity accurately, it is critical to use current
11 market data because it increases the chance that the authorized ROE will match Aquarion’s
12 market-based COE when it needs to raise equity capital.

13 My COE recommendation reflects the return investors require to provide equity
14 capital to Aquarion based on current capital markets. My recommendation is consistent
15 with the following legal standards set by the United States Supreme Court for a fair rate of
16 return: “[t]he return to the equity owner should be commensurate with returns on
17 investments in other enterprises having corresponding risks”²⁴ and “sufficient to... support
18 its credit and... raise the money necessary for the proper discharge of its public duties.”²⁵

²⁴ Fed. Power Comm’n v. Hope Nat. Gas Co. v. Hope Nat. Gas Co., 320 U.S. 591, 603 (1944).

²⁵ Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm’n of the State of W. Va., 262 U.S. 679, 692-693 (1923).

1 Because the cost of equity is not a published figure like a bond yield, some
2 interpretation is required to determine the appropriate market price. My cost of equity
3 recommendation is based on my computation of what the market indicates investors require
4 (return on investment) to provide capital to companies with comparable risk to Aquarion.

5 As explained below, I use current market prices (e.g., stocks, bonds, options), which
6 measure investors' expectations directly, instead of relying solely on historical data and
7 analyst forecasts.

8 A COE based on current market prices (market-based) is superior to a COE based
9 on historical data in two respects:

10 1. The COE that Aquarion has to pay investors is based on capital markets.

11 Recent high inflation and increases in interest rates are not a secret and
12 therefore market-based COE models will reflect investors' changing
13 expectations.

14 2. Capital markets are unpredictable. Regarding capital markets'
15 unpredictability, investment guru Warren Buffet recently gave the
16 following advice to investors: "[t]hey should not listen to a lot of the
17 jabbering about what the market is going to do tomorrow, or next week or
18 next month because nobody knows."²⁶

19 Current capital markets are our best source of investors' expectations regarding
20 future capital markets. Current market prices of stocks and bonds reflect investors'
21 forecasts for long-term interest rates and capital markets in general.

²⁶ PBS News Hour, Part 1 – America should stand for more than just wealth, says Warren Buffett (June 26, 2017,) at www.pbs.org/newshour/show/pbs-newshour-full-episode-june-26-2017.

1 **Q. HAS YOUR METHODOLOGY BEEN RECOGNIZED BY OTHER**
2 **COMMISSIONS?**

3 **A.** Yes. My CAPM method has also been recognized by state utility commissions. On April
4 9, 2020, the South Carolina Public Service Commission stated the following:

5 Amongst the three witnesses, Consumer Affairs Rothschild’s approach was
6 unique in that he included the use of both historical and forward-looking,
7 market-based data in his analysis. Based on the testimony and facts
8 presented, the Commission therefore adopts the recommended ROE of
9 7.46% proposed by witness Rothschild.²⁷

10 In a 2024 decision, the California Public Utilities Commission (CPUC) found merit
11 in my analysis and used my cost of equity methodology, including the CAPM and DCF
12 methods I use in this proceeding, to determine the authorized ROEs for California’s ten
13 Independent Small Telephone Companies (ILECs).²⁸

14 **Q. HOW DID YOU ARRIVE AT YOUR COE RECOMMENDATION?**

15 **A.** To arrive at my recommendation, I applied the DCF model, including two Constant Growth
16 and one Non-Constant Growth methods, and four variations of the CAPM analysis to a
17 group of similar companies (“Nowak Proxy Group”) using data available through April 30,
18 2026, as discussed below. In all of my models, I use both historical averages and the most
19 recently available spot data for the inputs wherever it is possible and applicable.

²⁷ Order Ruling on Application for Adjustment in Rates, Docket No. 2019-290-WS, Order No. 2020-306, April 9, 2020, page 43.

²⁸ CPUC Decision Determining the Cost of Capital for Ratemaking Purposes for California’s Independent Small Telephone Companies, Application 22-09-003, page 22.

1 **Q. CONSIDERING THAT STOCK AND OPTION PRICES AND BOND YIELDS**
2 **CHANGE DAILY, WOULD IT NOT BE BETTER TO USE HISTORICAL**
3 **AVERAGES EXCLUSIVELY FOR THE INPUTS IN YOUR MODELS?**

4 **A.** Not necessarily. Most people would agree that the use of spot market data, the value of a
5 particular input on a particular day, can lead to COE results that can vary over short periods
6 of time. It may therefore be tempting to find a more stable value based on historical
7 averages that are not overly influenced by short-term fluctuations in capital markets. When
8 doing a forward-looking analysis, however, it is equally important to look at the most
9 recent market data as an indication of trends and where a given value is more likely to be
10 in the future. This is a broad and generally accepted principle, as made clear in the
11 following example.

12 As a simple example using historical stock prices to make the point clear, if
13 Company A's stock price were to go up linearly over the course of one year from \$50 to
14 \$100, its average stock price over that year would be \$75. If Company B's stock price
15 declined linearly from \$100 to \$50 over the same year, it would have the same exact
16 average stock price of \$75. However, most people would agree that predicting both stock
17 prices at \$75 over the near future would be overly simplistic and leave readily accessible
18 data unused. Without relying on any additional data, at the very least, it would stand to
19 reason that in the near future, Company A's stock price is more likely to be between \$75
20 and \$100 than Company B's stock price, and that Company B's stock price is more likely
21 to be between \$50 and \$75 than Company A's stock price. These observations cannot be
22 made by looking at the yearly averages alone and must take the most recent data into special
23 consideration.

1 This does not eliminate concerns regarding the effect of daily fluctuations in market
2 data, especially during periods of volatility. As a result, it is important to consider both
3 historical averages and recent spot values when using market data for forward-looking
4 analyses. That is precisely my approach when using market data that are expected to
5 continue to fluctuate, such as stock prices, dividend yields, betas²⁹, and market risk premia.

6 **Q. CAN A DIFFERENCE OF ONE DAY IN THE SELECTION OF SPOT DATA**
7 **HAVE A SIGNIFICANT POSITIVE OR NEGATIVE EFFECT ON ROE**
8 **RESULTS? IF SO, HOW DO YOU GO ABOUT CHOOSING WHICH DAY TO**
9 **USE FOR MARKET-BASED SPOT DATA?**

10 **A.** Daily fluctuations in stock prices, resulting dividend yields, betas, etc., all have an impact
11 on resulting ROE calculations, especially when using recent spot values for market data.
12 Such is the nature of market data, which changes from day to day. This is rightfully noted
13 as a potential risk of using spot data, but, given the stated benefits of using recent spot data
14 for forward-looking analyses, there are ways to address such potential pitfalls.

15 For this reason, it is very important to establish consistent methodologies that
16 eliminate the possibility of personal bias, especially when using spot market data. I
17 consistently use the last trading day of the month as the reference point for all market-based
18 spot data. Additionally, this day serves as the cutoff for calculating all historical market-
19 data averages.

²⁹ Beta is a component of the Capital Asset Pricing Model (CAPM) used to measure the systematic risk of a security relative to the overall market. Mathematically, it is the covariance of the return on an individual security with the return on the market portfolio, divided by the variance of the market return. In practice, Beta serves as a scaling factor: a Beta of 1.0 indicates a security that moves in tandem with the market, while a Beta below 1.0, typical for regulated utilities, indicates the security is less volatile than the broader market.

1 It is important to keep in mind that even averages fluctuate over time, and all
 2 responsible data analysts must find a consistent and reproducible way to “freeze time” to
 3 work with such fluctuations while eliminating bias.

4 It is also important to point out once again that I use recent spot market data to
 5 establish one benchmark for market-based inputs, which are balanced by the use of
 6 historical averages, as stated previously.

7 **B. Proxy Group Selection**

8 **Q. WHAT PROXY GROUPS DID YOU USE TO CALCULATE AQUARION’S COE?**

9 **A.** My comparable proxy group, shown on Table 5 below and referred to as the Nowak Proxy
 10 Group, consists of the following 11 publicly traded gas and water utility companies covered
 11 by Value Line. Mr. Nowak’s proxy group contains the same 11 companies.

TABLE 5: NOWAK PROXY GROUP COMPOSITION

	Company Name	Ticker
1	AMER. STATES WATER	AWR
2	CALIFORNIA WATER	CWT
3	MIDDLESEX WATER	MSEX
4	ATMOS ENERGY CORP.	ATO
5	NI SOURCE INC.	NI
6	NEW JERSEY RES.	NJR
7	N.W. NATURAL	NWN
8	ONE GAS, INC.	OGS
9	SPIRE INC.	SR
10	SOUTHWEST GAS	SWX
11	H2O AMERICA	HTO

12
 13 I chose this proxy group because I believe it contains companies that are relatively
 14 comparable in risk to Aquarion. However, model results based on this proxy group should

1 be viewed as a conservative estimate of Aquarion's COE because these companies have
2 some unregulated operations which are riskier than water distribution.

3 In a regulated environment, Aquarion operates under a regulatory framework that
4 provides for the recovery of prudently incurred costs and a reasonable opportunity to earn
5 a return. Conversely, unregulated operations are riskier because they are subject to
6 competition. Because investors demand a higher return to compensate for greater
7 uncertainty, the proxy group's COE is likely higher than Aquarion's.

8 C. Discounted Cash Flow Models

9 **Q. PLEASE SUMMARIZE THE RESULTS OF YOUR DCF MODELS.**

10 **A.** I used both the constant growth form of the DCF method, which determines growth based
11 on the sustainable retention growth procedure, and a non-constant growth DCF method.
12 The results of my constant growth DCF model range between 9.12% and 9.27% when
13 using a sustainable growth rate and between 6.83% and 7.33% when using an option-
14 implied growth rate.³⁰ The results of my non-constant growth DCF method indicate a COE
15 of between 7.07% and 7.28% for the Nowak Proxy Group.³¹

16 **Q. WHAT IS THE DISCOUNTED CASH FLOW METHOD?**

17 **A.** The DCF method is an approach to determine the COE. The method recognizes that
18 investors purchase common stock to receive future cash payments. These payments come
19 from: (a) current and future dividends, and (b) proceeds from selling stock. A rational
20 investor will buy stock to receive dividends and ultimately to sell the stock to another

³⁰ Exhibit ALR-3, page 1.

³¹ Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4.

investor at a gain. The price the new owner is willing to pay for stock is related to that buyer's expectation of future flow of dividends and the future expected selling price. The value of the stock is the discounted value of all future dividends until the stock is sold plus the value of proceeds from the sale of the stock.

D. Constant Growth Form of the DCF Model

Q. YOU STATE YOU USED THE CONSTANT GROWTH FORM OF THE DCF MODEL. WHAT IS THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. The constant growth form of the DCF model is a form of the DCF method that can be used in determining the COE when investors can reasonably expect that the growth of retained earnings and dividends will be constant.

Retained earnings are funds that a company keeps in its treasury, so that they are available for future needs, such as capital expenditures, debt payments, and new investments. These retained earnings show investors whether the company is growing, which, in turn, is a measure of the future indicator of dividends and the value of a company's stock.

Q. DESCRIBE HOW THE CONSTANT GROWTH MODEL WORKS.

A. The constant growth model is described by the equation $k = D/P + g$, where: ³²

k= cost of equity (COE);

D=dividend; and

P=market price of stock at time of the analysis

and where:

³² Myron J. Gordon, *Cost of Capital to a Public Utility*, p. 32-33 (MSU Public Utility Studies 1974).

g=the growth rate, where $g = br + sv$;
b=the earnings retention rate;
r=return on common equity investment (referred to below as “book equity”);
v=the fraction of funds raised by the sale of stock that increases the book value of the existing shareholders’ common equity; and
s=the rate of continuous new stock financing

The constant growth model is therefore correctly recognized to be:

$$k = D/P + (br + sv)$$

The COE demanded by investors is the sum of two factors. The first factor is the dividend yield. The second factor is growth (dividends and stock price). The logical relationship among these factors is as follows: the dividend yield is calculated based on current dividend payments while growth indicates what dividends and stock price will be in the future.

Q. WHAT OTHER FACTORS IMPACT HOW ONE USES THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. Sufficient care must be taken to be sure that the growth rate “g” is representative of the constant sustainable growth. To obtain an accurate constant growth DCF result, the mathematical relationship between earnings, dividends, book value and stock price must be respected.

The basic difference between the use of an analyst’s earnings per share growth rate in the constant growth DCF formula and using the “br” (b (the earnings retention rate) X r (rate of return on common equity investment)) approach is that the “br” form, if properly applied, eliminates the mathematical error caused by an inconsistency between the expectations for earnings per share growth and dividends per share growth. Because it eliminates that error, the results of a properly applied “br” approach will be superior to the

1 answer obtained from other approaches to the constant growth form of the DCF model.
2 This is not to say that even a properly applied “br” approach will be perfect. The self-
3 correcting nature of a properly applied “br” to forecasted differences in earnings per share
4 and dividends per share growth rates helps to mitigate the resultant error but should not be
5 viewed as the perfect way to quantify the impact of expected non-constant growth rates.

6 **Q. HOW HAVE YOU IMPLEMENTED THE CONSTANT GROWTH FORM OF THE**
7 **DCF MODEL IN THIS CASE?**

8 **A.** I have applied the constant growth form of the DCF model by staying true to the
9 mathematically derived “ $k=D/P + (br + sv)$ ” form of the DCF model. I have also taken
10 care to fully allocate all future expected earnings to either future cash flow in the form of
11 dividends (“D”) or to retained earnings (the retention rate, “b”). This extra accuracy is
12 obtained only when the retention rate “b” is derived from the values used for “D” and “r,”
13 rather than independently.

14 **Q. PLEASE EXPLAIN HOW YOU OBTAINED THE VALUES YOU USED IN THE**
15 **CONSTANT GROWTH FORM OF THE DCF METHOD.**

16 **A.** The DCF model generally calls for the use of the dividend expected over the next year. A
17 reasonable way to estimate next year’s dividend rate is to increase the quarterly dividend
18 rate by half of the current actual quarterly dividend rate. This is a good approximation of
19 the rate that would be obtained if the full prior year’s dividend were escalated by the entire
20 growth rate.³³

³³ For example, assume a company paid a dividend of \$0.50 in the first quarter a year ago, and has a dividend growth rate of 4 % per year. This dividend growth rate equals $(1.04)^4 - 1 = 0.00985$ % per quarter. Thus, the

1 I obtained the stock price—“P”—used in my DCF analysis from the closing prices
2 of the stocks on April 30, 2026. I also obtained an average stock price for the 12 months
3 ending April 30, 2026 by averaging the high and low stock prices for the year.

4 I based the value of the future expected return on equity— “r” —on the average
5 return on book equity expected by Value Line, adjusted in consideration of recent returns.
6 I also made a computation that was based on a review of both the earned return on equity
7 consistent with analysts’ consensus earnings growth rate expectations and on the actual
8 earned returns on equity. For a stable industry such as utility companies, investors will
9 typically look at actual earned returns on equity as one meaningful input into what can be
10 expected for future earned returns on book equity.³⁴

11 This return on book equity expectation used in the DCF method to compute growth
12 must *not* be confused with the COE. Since the stock prices for the comparative companies
13 are substantially higher than their book value, the return investors expect to receive on their
14 market price investment is considerably less than the anticipated return on book value. If
15 the market price is low relative to book value, the COE will be higher than the future
16 expected return on book equity, and if the market price is high, then the return on book
17 equity will be greater than the COE.

dividend is \$0.5049 in the second quarter, \$0.5099 in the third quarter, and \$0.5149 in the fourth quarter. If that 4 % per annum growth continues into the following year, then the dividend would be \$0.5199 in the first quarter, \$0.5251 in the second quarter, \$0.5303 in the third quarter, and \$0.5355 in the fourth quarter. Thus, the total dividends for the following year equal \$2.111 ($0.5199 + 0.5251 + 0.5303 + 0.5355$). I computed the dividend yield by taking the current quarter (the \$0.5149 in the fourth quarter in this example) and multiplying it by 4 to get an annual rate of \$2.06. I then escalated this \$2.06 by half the 4 % growth rate, which means it is increased by 2 %. $\$2.06 \times 1.02 = \2.101 , which is within one cent of the \$2.111 obtained in the example.

³⁴ Exhibit ALR-3, page 1.

1 In addition to growing through the retention of earnings, utility companies also
2 grow by selling new common stock. Selling new common stock increases a company's
3 growth. I quantified this growth caused by the sale of new common stock by multiplying
4 the amount that the actual market-to-book ratio exceeds 1.0, by the compound annual
5 growth rate of stock that Value Line forecasts. As explained more in Appendix C, I used
6 this formula because it represents the "sv" component of the sustainable growth equation,
7 which captures the additional growth in book value per share that occurs when new equity
8 is issued at a premium to book value. The results of that computation are shown on line 4
9 of Exhibit ALR-3, page 1.

10 Pure financial theory prefers concentrating on the results from the most current
11 price because investors cannot purchase stock at historical prices. There is a legitimate
12 concern, however, about the potential distortion of using just a single price. I present DCF
13 results based on the most recent stock pricing data (April 30, 2026) as well as the average
14 of the high and low stock price over the past 12 months to obtain a range of reasonable
15 values. The DCF result based on the average of the high and low stock price for the year
16 ending April 30, 2026, is 9.12%. As shown in Exhibit ALR-3, page 1, the DCF result
17 based on the stock price as of April 30, 2026, is 9.27%. Exhibit ALR-3, page 1, shows
18 more of the specifics of how I implemented the constant growth form of the DCF model
19 for the Nowak Proxy Group.

1 **Q. PLEASE EXPLAIN HOW YOU DETERMINED WHAT VALUE TO USE FOR “r”**
2 **WHEN COMPUTING GROWTH IN YOUR CONSTANT GROWTH FORM OF**
3 **THE DCF MODEL.**

4 **A.** The inputs I considered are shown in Footnote [C] of Exhibit ALR-3, page 1. The value
5 of “r” that is appropriate to use in the DCF formula is the value anticipated by investors to
6 be maintained on average in the future. This Exhibit shows that the average future return
7 on equity forecasted by Value Line for the Nowak Proxy Group between 2026 and 2029-
8 31 is 10.00%. The same footnote also shows that the future expected return on equity
9 derived from the Zacks³⁵ consensus forecast is 9.06%, and that the actual returns on equity
10 earned by the Nowak Proxy Group on average were 8.77% in 2023, 9.47% in 2024, and
11 9.28% in 2025. Based on the combination of the forecasted return on equity derived from
12 the Zacks consensus, the recent historical actual earned returns, and Value Line’s forecast,
13 I made the DCF growth computation using a 9.20%³⁶ value of “r”.

14 **Q. WHAT COE IS INDICATED BY THE CONSTANT GROWTH FORM OF THE**
15 **DCF METHOD THAT YOU RELY ON FOR YOUR RECOMMENDATION?**

16 **A.** The result of my DCF analysis using the Constant Growth form of the DCF indicates a
17 COE range of between 9.12% and 9.27% for the Nowak Proxy Group.³⁷ Since these DCF
18 findings use analysts’ forecasts to derive sustainable growth (in part) and on analysts’
19 forecasts of dividend growth and book value growth in the non-constant form of the DCF
20 method, the results should be considered as conservatively high. This is because, as

³⁵ Zacks is a prominent research platform that aggregates earnings estimates from independent investment analysts.

³⁶ I used 9.20% in consideration of historical returns, Zacks’s projections, and Value Line projected returns for the Nowak Proxy Group.

³⁷ Exhibit ALR-3, page 1.

1 previously mentioned above, analysts' forecasts of such growth have been notoriously
2 overstated, and because, as noted, the COE in general is declining.

3 My results are not as influenced by overly-optimistic analysts' forecasts as would
4 have been the case had I merely used analysts' five-year earnings growth rate forecasts as
5 a proxy for long-term growth. This is because the DCF methods I use compute sustainable
6 growth rates, rather than growth rates that can exaggerate the growth rate due to assuming
7 that a relatively short-term forecast (5 years) will remain indefinitely.

8 **Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE NON-CONSTANT**
9 **GROWTH FORM OF THE DCF MODEL.**

10 **A.** The non-constant growth form of the DCF model determines the return on investment
11 expected by investors based on an estimate of each separate annual cash flow the investor
12 expects to receive. For the purpose of this computation, I have incorporated Value Line's
13 detailed annual forecasts to arrive at the specific non-constant growth expectations that an
14 investor who trusts Value Line would expect. This implementation is shown on Exhibit
15 ALR-3, page 3 and Exhibit ALR-3, page 4. In the first stage, cash flow entry is the cash
16 outflow an investor would experience when buying a share of stock at the market price.
17 The subsequent years of cash flow are equal to the dividends per share that Value Line
18 forecasts. For the intermediate years of the forecast period in which Value Line does not
19 provide a specific dividend, the annual dividends were obtained by estimating that dividend
20 growth would persist at a compound annual rate. The cash flow at the end of the forecast
21 period consists of both the last year's dividend forecast by Value Line, and the proceeds
22 from the sale of the stock. The stock price used to determine the proceeds from selling the

1 stock was obtained by estimating that the stock price would grow at the same rate at which
2 Value Line forecasts book value to grow.

3 **Q. WHY DID YOU USE BOOK VALUE GROWTH TO PROVIDE THE ESTIMATE**
4 **OF THE FUTURE STOCK PRICE?**

5 **A.** For any given earned return on book equity, earnings are directly proportional to the book
6 value. Furthermore, book value growth is the net result after the company produces
7 earnings, pays a dividend and also, perhaps, either sells new common stock at market price
8 or repurchases its own common stock at market price.

9 Once these cash flows are entered into an Excel spreadsheet, the compound annual
10 return an investor would achieve as a result of making this investment was obtained by
11 calculating the Internal Rate of Return (IRR).³⁸ This multi-stage DCF model produced an
12 average indicated COE of 7.07% based on the year-end stock price, and 7.28% based on
13 average prices for the year ending April 30, 2026, for the Nowak Proxy Group as shown
14 on Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4.

15 **Q. WHAT COST OF EQUITY DOES YOUR NON-CONSTANT GROWTH DCF**
16 **METHOD INDICATE?**

17 **A.** My non-constant growth DCF method indicates a cost of equity of between 7.07% and
18 7.28%.³⁹

³⁸ The IRR is the rate of return that an investment is expected to generate. On the other hand, the cost of capital is the minimum return an investment needs to make for it to be worthwhile.

³⁹ Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4.

E. Capital Asset Pricing Model

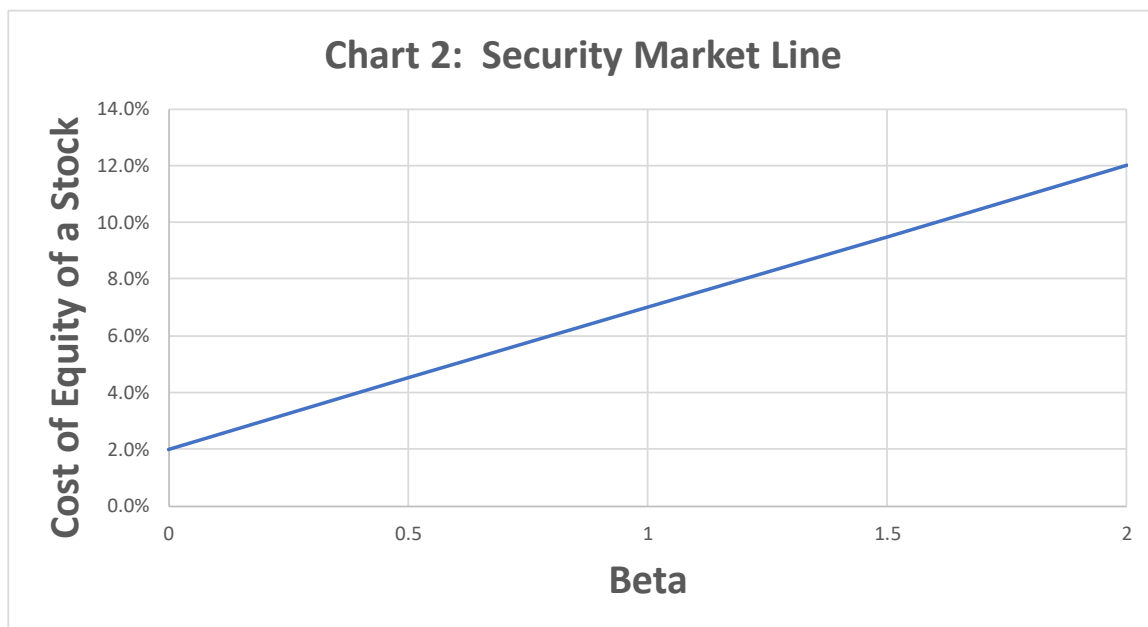
Q. PLEASE DESCRIBE THE CAPM.

A. CAPM stands for “Capital Asset Pricing Model.” The CAPM relates return to risk; specifically, it relates the expected return on an investment in a security to the risk of investing in that security. The riskier the investment, the greater the expected return (i.e., the cost of equity) investors require to make that investment.

Investors in a firm’s equity face two types of risks: (1) firm-specific risk and (2) market risk (financial analysts refer to this market risk as systematic risk). Firm-specific risk refers to risks unique to the firm, such as management performance and losing market share to a new competitor. Investors can reduce firm-specific risk by purchasing stocks as part of a diverse portfolio of companies if they construct the portfolio to cause the firm-specific risk of individual companies to balance out. Market-related risk refers to potential impacts from the overall market, such as a recession or interest rate changes. This risk cannot be removed by diversification, so the investor must bear it no matter what. Since the investor has no option but to bear market risk, the investor’s cost of equity will reflect that risk.

The price of a stock with a beta of 1 tends to move with the market. If the market increases by 1%, the stock is also expected to increase by about 1%, and vice versa. The price of a stock with a beta less than 1 tends to be less volatile than the market. For example, a stock with a beta of 0.5 will on average be 50% less volatile than the market. If the market rises by 1%, the price of a stock with a beta of 0.5 is expected to rise by 0.5%, and if the market falls by 1%, the stock price is expected to decrease by 0.5%. On the other hand, the price of a stock with a beta greater than 1 tends to be less volatile than the market.

1 The CAPM predicts that for a given equity security, the cost of equity has a linear
2 relationship to how sensitive the stock's returns are to movements in the overall market
3 (e.g., S&P 500). A security's market sensitivity is measured by its beta. As shown in
4 Chart 2 below, the higher the beta of a stock, the higher the company's cost of equity—the
5 return required by the investor to invest in the stock.



6
7 Here is the standard CAPM formula:

$$K = R_f + \beta_i * (R_m - R_f)$$

8
9 Where:

10 K is the cost of equity;

11 R_f is the risk-free interest rate;

12 R_m is the expected return on the overall market (e.g., S&P 500);

13 [R_m – R_f] is the premium investors expect to earn above the risk-free rate
14 for investing in the overall market (“equity risk premium” or
15 “market risk premium”); and β_i (Beta) is a specific asset’s share of
16 non-diversifiable, or systematic, risk.

1 **Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE CAPM.**

2 **A.** First, I determined appropriate values or ranges for each of the three model inputs: (a) Risk-
3 Free Rate, (b) Beta, and (c) Equity Risk Premium. Second, I used the equation above to
4 calculate the cost of equity implied by the model. Below I will explain how I calculated
5 the three model inputs and summarize the CAPM cost of equity numbers resulting from
6 those inputs. Table 6 and Table 7 on page 51 show the results of my CAPM.

7 **Risk-Free Rate**

8 **Q. WHAT RISK-FREE RATE DID YOU USE IN YOUR CAPM?**

9 **A.** It is generally preferable to use the market yield on short-term U.S. Treasury securities as
10 the risk-free rate because these assets have a beta close to zero. *Principles of Corporate*
11 *Finance* states “The CAPM... calls for a short-term interest rate.”⁴⁰ I chose to use a risk-
12 free rate based on both long- and short-term Treasury yields, however, because, as
13 indicated by the recent inverted yield curve,⁴¹ investors with a longer investment horizon
14 would likely use a lower risk-free rate as an opportunity cost for their investment decisions.
15 It is commonplace in utility rate case proceedings to consider a risk-free rate based on long-
16 term investments. My short-term risk-free rate is based on the yield of 3-month U.S.
17 Treasury bills and my long-term risk-free rate is based on the yield of 30-year U.S.
18 Treasury bonds. In line with my Spot and Weighted Average CAPM approaches, I use

⁴⁰ RICHARD BREALEY, STEWART MYERS, & FRANKLIN ALLEN, *Principles of Corporate Finance*, p. 228, (McGraw-Hill Irwin, New York, 12th ed. 2017).

⁴¹ The yield curve on U.S. Treasury bonds relates the yield to its time to maturity. We say the current yield curve is steep because the difference in yield between short-term (near 0%) and long-term (over 1%) bonds is large in percentage terms.

1 both spot values as of April 30, 2026, and weighted averages over the 3 months ending on
2 that date for these two yields.

3 As outlined in Exhibit ALR-4, page 2, my spot and weighted average short-term
4 risk-free rates are 3.68% and 3.68%, respectively. My spot and weighted average long-
5 term risk-free rates are 4.98% and 4.86%, respectively.

6 U.S. government bonds are reasonable to use as a risk-free rate because they have
7 a negligible risk of default. The value of short-term U.S. Treasury bills has a relatively
8 low exposure to swings in the overall market. The value of long-term U.S. Treasury bonds
9 is relatively more exposed to the market and therefore must be used with caution.

10 **Q. WHAT IS YOUR RESPONSE TO ANALYSTS WHO CLAIM THAT THE CAPM**
11 **SHOULD BE IMPLEMENTED WITH A RISK-FREE RATE BASED ON A LONG-**
12 **TERM INTEREST RATE (E.G., YIELD ON 30-YEAR TREASURY BOND)**
13 **AND/OR BASED ON INTEREST RATE FORECASTS INSTEAD OF MARKET**
14 **YIELDS.**

15 **A.** As discussed in Section V.E, a CAPM analysis that uses a risk-free rate based only on long-
16 term interest rates may overstate the COE because these bonds do not have a zero beta. It
17 is not appropriate to use a risk-free rate based on interest rate forecasts because it often
18 does not represent investors' expectations.

19 **Beta**

20 **Q. WHAT BETA DID YOU USE IN YOUR CAPM?**

21 **A.** Since the cost of equity should be based on investor expectations, I chose to use two betas.
22 My "forward beta" is based on forward-looking investor expectations of non-diversifiable

1 risk. My “historical blended” beta is based on historical return data over 6-month, 2-year,
2 and 5-year periods.

3 Most published betas are based exclusively on historical return data. For example,
4 Value Line publishes a 5-year historical beta for each of the companies it covers. However,
5 it is also possible to calculate betas based on investors’ expectations of the probability
6 distribution of future returns. This probability distribution of future returns expected by
7 investors can be calculated based on the market prices of stock options.

8 **Q. WHAT IS A STOCK OPTION?**

9 **A.** A stock option is the right to buy or sell a stock at a specific price for a specified amount
10 of time. A call option is the right to buy a stock at a specified exercise or strike price on
11 or before a maturity date. A put option is the right to sell a stock at a specified exercise or
12 strike price on or before a maturity date. For example, a call option to purchase 100 shares
13 of Apple Computer stock for \$230 on January 17, 2020, allows the owner the option (not
14 the obligation) to buy Apple stock for \$230 on that date. At the end of July 2019, Apple
15 stock was trading at about \$215 per share. Why would anyone pay for the right to buy a
16 stock higher than the current price? Investors who purchased those call options thought
17 there was a chance Apple stock would be trading higher than \$230 on January 17, 2020,
18 and those options gave those investors the right to buy Apple stock for \$230 and profit by
19 selling it at the market price on that date, if it was higher. The price of Apple’s stock was
20 \$317.98 at the close of trading on January 17, 2020. Therefore, the investor who purchased
21 this call option for \$635 on July 31, 2019, earned a profit of \$8,163⁴² at expiry on January

⁴² \$8,163 profit from exercising call option (\$31,798 from selling at \$317.98 market price - \$23,000 cost to purchase at \$230) - \$635 (\$6.35 X 100) option purchase price. Note: Each call option is the right to purchase 100 shares.

1 17, 2020. On the other hand, the investor who purchased an Apple put option with the
2 same expiration date and strike price on July 31, 2019, would have lost the price of the
3 option (\$2,248) and gained nothing on the expiration date because the right to sell Apple
4 stock for \$230 when the price is over \$300 is worthless.

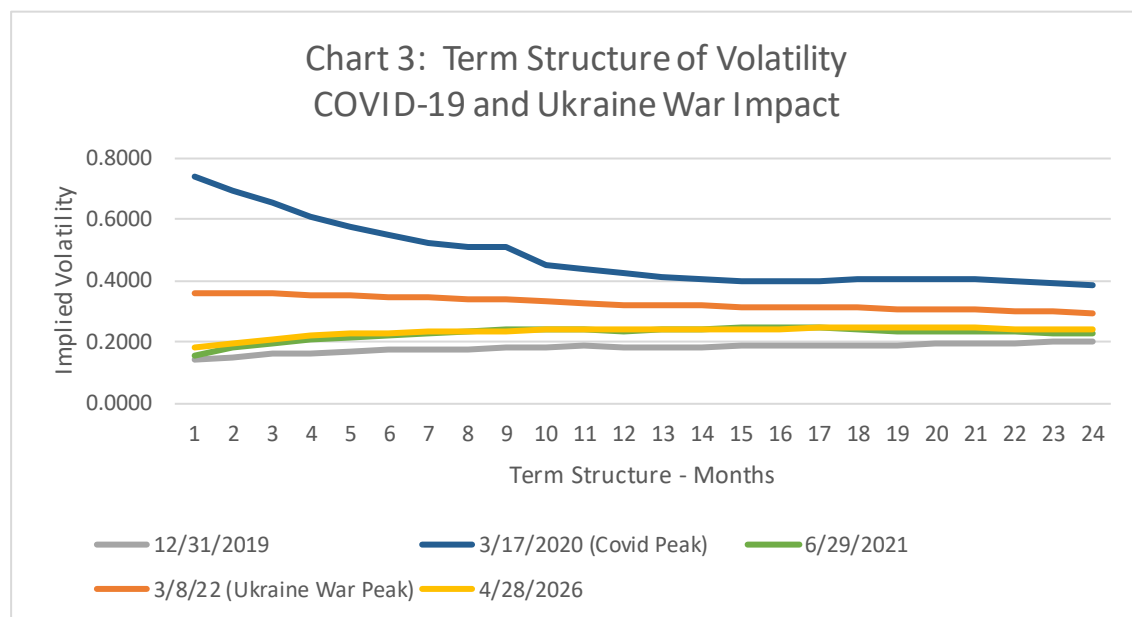
5 Options can be used to assess future expectations for volatility because they track
6 the type of variation in market price that investors bet will occur within the time frame
7 during which an option can be exercised based on what type of option is purchased and
8 what the difference is between the market price of stock and the option price, or the price
9 that the option bets the stock will reach. As the distance between the market price and
10 option price grows, more volatility is implied in the value of the stock over time. I used
11 these option data to create an “implied volatility” value.

12 **Q. PLEASE EXPLAIN THE TERM “STRUCTURE OF VOLATILITY.”**

13 **A.** Investors can expect volatility to increase or decrease over time. In general (i.e., in
14 “normal” financial markets), investors expect higher volatility for longer time horizons.
15 For example, investors generally expect that the chance stock prices will increase or
16 decrease by 10% in 1 year to be greater than the chance of a 10% (annualized) move over
17 the next 30 days. This makes sense because there is more uncertainty regarding economic
18 and stock market changes the farther into the future you look.

19 However, during the height of a crisis, when volatility generally tends to rise in the
20 short-term, investors often expect volatility to decrease in coming months or years. In
21 other words, investors expect the current capital market hurricane to pass and the winds to
22 die down. During the peak of implied volatility in mid-March 2020, shortly after the World
23 Health Organization declared COVID-19 a pandemic, the data indicated that investors

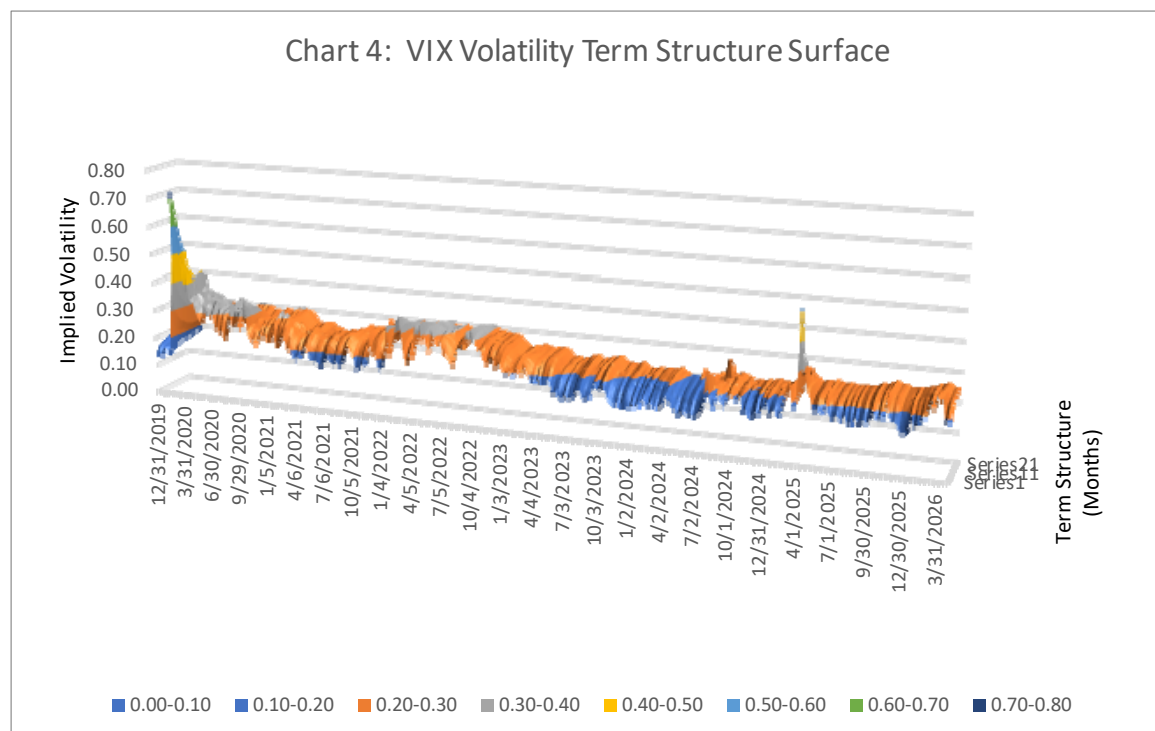
1 expected stock price volatility to decrease over time. This implies that investors expected
 2 the riskiness of equity investments to decrease over time. As shown in Chart 3 below,
 3 before the COVID-19 outbreak, investors expected volatility to increase from less than
 4 15% annually at the 1-month time frame to about 20% annually at the 24-month time frame.
 5 Investors' volatility expectations peaked in March 2020. At that time, investors expected
 6 stock price volatility would decrease from over 70% at the 1-month time frame to about
 7 38% at the 24-month time frame. Chart 3 also shows that investors' volatility expectations
 8 were higher for all time frames when Russia invaded Ukraine as compared to 2021, but as
 9 of April 30, 2026 volatility expectations have dropped back closer to 2019 levels over the
 10 full term structure of volatility.



11
 12 Chart 4 on page 40 provides a 3-dimensional surface⁴³ to show how the term
 13 structure of volatility has evolved since before the COVID-19 outbreak and how it has

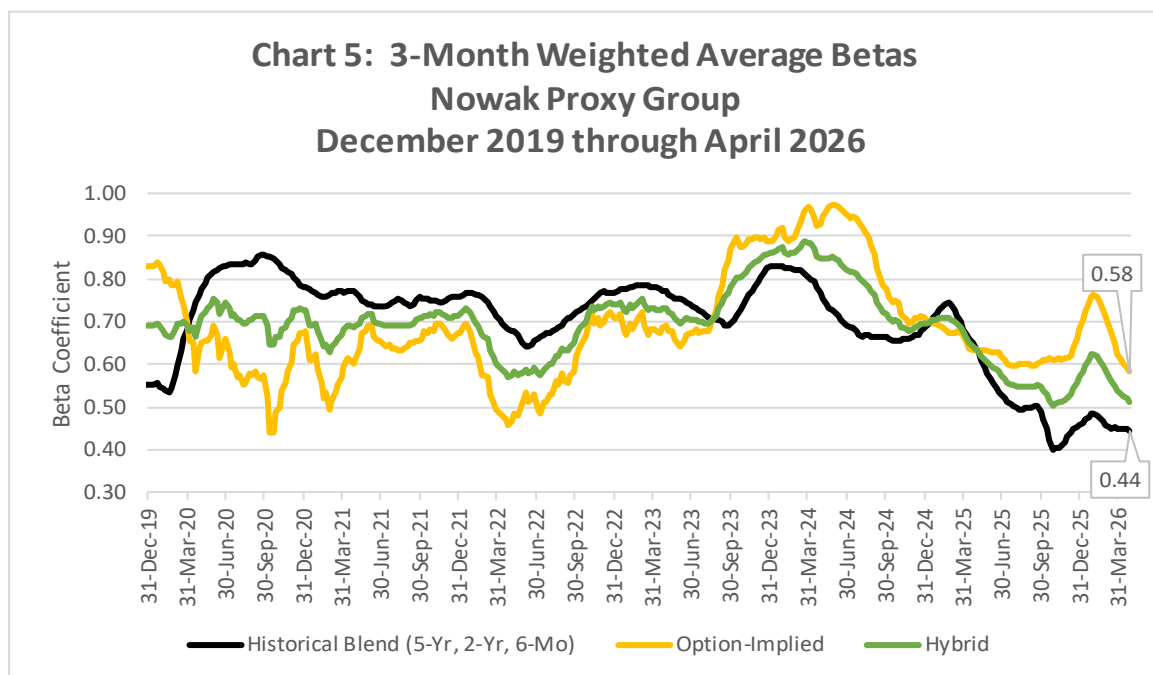
⁴³ The X axis shows the implied volatility. The Y axis shows the data. The Z axis shows market expectation of future implied volatility of different time frames. Series1 = 1 month, Series11 = 11 months, and Series24 = 24 months.

changed during and since the outbreak. As seen above in Chart 3 on page 39, which shows five cross-sections of these data, during periods of low implied volatility – such as before the COVID-19 outbreak and at present – the slope of volatility expectations over time gently curves upwards, indicating lesser expectations of volatility in the short-term and greater in the long term. In Chart 4, this is represented by the surface of the line curving up and away during times of low volatility, while appearing to move downwards along the z-axis during the period of high volatility in March-April 2020 during the initial outbreak of the pandemic. Implied volatility can be seen to peak for both 1-month and 24-month time frames in mid-March 2020, with less dramatic spikes in February through October of 2022. As of the end of 4/28/2026, the term structure of volatility has returned to near pre-COVID levels.



1 **Q. PLEASE EXPLAIN HOW YOU CALCULATED THE BETAS USED IN YOUR**
 2 **CAPM.**

3 **A.** Traditionally, the betas used in CAPM calculations are calculated from historical returns.
 4 This approach has strengths and weaknesses. An alternative way to calculate betas is to
 5 incorporate investors' return expectations by calculating option-implied betas as explained
 6 in the previous paragraph. As discussed below, I have chosen to use both historical and
 7 option-implied betas in my CAPM analysis. I chose to use option-implied betas in my
 8 CAPM analysis because, among other reasons, studies have found that betas calculated
 9 based on investor expectations (option-implied) provide information regarding future
 10 perceived risks and expectations.⁴⁴



⁴⁴ Bo-Young Chang, Peter Christoffersen, Kris Jacobs & Gregory Vainberg. Option-Implied Measures of Equity Risk, *Review of Finance*, Vol. 16, Issue 2, pp. 385-428 (April 2012) available at <https://academic.oup.com/rof/article/16/2/385/1584560>.

1 As shown in Chart 5 on page 41, stock option prices indicate that investors likely
2 expect lower betas for the Nowak Proxy Group in the future.

3 Exhibit ALR-4, page 3 contains the last three months of data used in creating Chart
4 5 on page 41, which is what I use in my CAPM analysis. Specifically, I use the following
5 two betas in my CAPM analysis:

6 1. **Historical Blend:** 50% (6 months) + 30% (2 years) + 20% (5 years).

7 2. **Forward Beta:** 100% Option-Implied Beta (6 months).

8 **Q. WHY DO YOU USE PERIODS OF 6 MONTHS, 2 YEARS, AND 5 YEARS FOR**
9 **YOUR HISTORICAL BETA CALCULATIONS, AS OPPOSED TO RELYING**
10 **EXCLUSIVELY ON THE 5-YEAR PERIOD USED BY VALUE LINE?**

11 **A.** Using shorter periods for the return regression analysis portion of the historical beta
12 calculation allows me to see if the correlation between the returns of each of the companies
13 in my Nowak Proxy Group and those of the S&P 500 Index has changed in the last 2 years
14 or 6 months. Using a 5-year period exclusively tends to make recent changes in the
15 correlation more difficult to identify because of the weight of 5 years of data.

16 **Q. WOULD YOU AGREE THAT CHANGES IN MARKET DYNAMICS WILL HAVE**
17 **A LARGER EFFECT ON 6-MONTH HISTORICAL BETAS THAN THEY WILL**
18 **ON 2-YEAR OR 5-YEAR HISTORICAL BETAS?**

19 **A.** Yes. As with other historical metrics based on a given time period, say, average stock
20 prices, the longer the time horizon under consideration, the more data points are
21 considered, and the smaller the effect of any one given change in the data set.

1 **Q. IS THIS LARGER EFFECT ON 6-MONTH HISTORICAL BETAS FROM**
2 **CHANGES IN MARKET DYNAMICS A GOOD OR A BAD THING?**

3 **A.** The answer depends on what the beta will be used for. I would argue that in any attempt
4 to forecast the beta coefficient of a company for any near-term forward-looking analysis
5 such as the cost of capital calculations in this proceeding, more recent historical data should
6 be given more relevance than data from 5 or 10 years ago. The weight of 10 years of data
7 makes a beta coefficient react extremely slowly to market developments. Even pronounced
8 permanent market changes can take more than 6 months to have a detectable effect on a
9 10-year beta.

10 As with using spot values and averages of historical market data, I believe the right
11 answer is not to use *either* 6-month historical betas or historical betas with longer horizons,
12 but to consider *both*. For this reason, I have created my historical blended betas, which
13 take into consideration 6-month, 2-year, and 5-year historical betas.

14 **Q. DO YOU THINK IT IS A GOOD IDEA TO RELY ON 6-MONTH HISTORICAL**
15 **BETAS DESPITE MARKET DEVELOPMENTS IN THE PAST YEAR THAT**
16 **SOME WOULD CALL “MARKET DISLOCATIONS?”**

17 **A.** Financial markets are constantly in flux due to the influence of countless factors. So-called
18 “market dislocations,” are just some of the numerous factors that are constantly affecting
19 markets. To attempt to separate any one specific factor from “real” underlying market
20 dynamics would be an exercise in futility.

21 Furthermore, predicting the duration and impact of any single influencing factor on
22 financial markets is extremely challenging, if not impossible. In 2008, when interest rates
23 plummeted to unprecedented lows, numerous analysts deemed this a temporary anomaly.

1 Contrary to these expectations, rates not only persisted at these low levels for more than
2 ten years but dropped even further in response to the unforeseen COVID-19 pandemic,
3 which significantly affected the global economy and financial markets.

4 So, in response, yes, I think it is a good idea to use 6-month historical betas to
5 measure recent and current market dynamics regardless of recent developments. I use them
6 as part of my historical blended betas in conjunction with longer-term historical betas and
7 forward-looking, option-implied betas to achieve the most reasonable result.

8 **Q. GIVEN THE SHORTER PERIOD COVERED BY 6-MONTH HISTORICAL**
9 **BETAS, CAN THEY STILL BE CONSIDERED STATISTICALLY**
10 **SIGNIFICANT? HOW MANY DATA POINT PAIRS ARE USED IN THE**
11 **CALCULATION OF YOUR 6-MONTH HISTORICAL BETA COEFFICIENTS?**

12 **A.** A 6-month historical beta based on weekly returns, calculated weekly, is calculated using
13 26 closing price points for a company and for its corresponding market index, in this case
14 the S&P 500 Index. This translates into 25 pairs of return data that are then used in the
15 regression analysis. This is most certainly enough data to achieve statistical significance
16 as addressed further below.

17 Furthermore, as stated above, the recent improvement in my calculation of
18 historical betas of using weekly returns on every day of the week as opposed to using only
19 one day of the week, as Value Line does, has the added benefit of providing significantly
20 more data pairs to be used in the regression analysis used to calculate beta. For 6-month
21 historical betas, instead of relying on 25 return pairs, the regression is performed on 117
22 return pairs.

1 **Q. PLEASE EXPLAIN HOW YOU CALCULATED OPTION-IMPLIED BETAS.**

2 **A.** Calculating option-implied betas of a company requires (1) obtaining stock option data for
3 that company and a market index, (2) filtering the stock option data, (3) calculating the
4 option-implied volatility for the company and for the index, (4) calculating the option-
5 implied skewness for the company and for the index, and (5) calculating option-implied
6 betas for the company based on implied volatility and skewness for the company and for
7 the index. There are various ways one could choose to perform the steps above, but I chose
8 to filter stock option data and calculate option-implied volatility⁴⁵ and skewness⁴⁶
9 following exactly the same methodology used by the Chicago Board of Options Exchange
10 (“CBOE”) in the calculation of their widely-used VIX (or Volatility Index) and SKEW
11 Index, respectively.

12 I start my process with publicly available trading information for all the options for
13 a given security (company or index) for a complete trading day. I then filter the option
14 data as described by the CBOE using the following guidelines:

- 15 1. Use the mid-quote or mark (average of bid and ask) as the option price.
- 16 2. Use only out-of-the-money call and put options.
 - 17 • Determine the “moneyness” threshold where absolute difference
18 between call and put prices is smallest (using CBOE “Forward Index
19 Price” formula).

⁴⁵ CBOE Volatility Index White Paper (2018) available at <https://cdn.cboe.com/resources/indices/srvix-white-paper.pdf>. Please note that the cover page says, “proprietary information.” However, this document has been in the public domain for over 3 years.

⁴⁶ The CBOE SKEW Index (2010) available at: <https://cdn.cboe.com/resources/indices/documents/SKEWwhitepaperjan2011.pdf>. Please note that the cover page says, “proprietary information.” However, this document has been in the public domain for over 3 years.

- Include “at-the-money” call and put options and use average of call and put prices as price for “blended” option.

3. Exclude all zero bids.

4. Exclude remaining (more out-of-the-money) options when two sequential zero bids are found.

I then apply the series of formulas clearly described in both of the CBOE’s white papers to the remaining options to calculate Option-Implied Volatility and Option-Implied Skewness. In the words of the CBOE, each of its two indices is “an amalgam of the information reflected in the prices betas using the following formula developed by Christoffersen, Chang, Jacobs and Vainberg (2011):⁴⁷

$$\beta_i = \left(\frac{SKEW_i}{SKEW_m} \right)^{1/3} \left(\frac{VAR_i}{VAR_m} \right)^{1/2}$$

Where:

β_i : option – implied beta of security (e.g. stock, fund);
 $SKEW_i$: skewness of security;
 $SKEW_m$: skewness of overall market (S&P 500);
 VAR_i : variance of security;
 VAR_m : variance of overall market (S&P 500).

⁴⁷ Bo-Young Chang, Peter Christoffersen, Kris Jacobs & Gregory Vainberg, Option-Implied Measures of Equity Risk, *Review of Finance* Volume 16, Issue 2, pp. 385-428 (April 2012) at <https://academic.oup.com/rof/article/16/2/385/1584560>

1 **Q. YOU CALCULATE YOUR OPTION-IMPLIED BETAS BASED ON A 6-MONTH**
2 **HORIZON. WOULD IT NOT BE BETTER TO USE A LONGER FORECASTING**
3 **HORIZON?**

4 **A.** The methodology I use to calculate my option-implied betas “allows for the computation
5 of a complete term structure of beta for each company so long as the options data are
6 available,”⁴⁸ so there is nothing inherent in the methodology that limits it to a certain time
7 horizon.

8 For many applications, including cost of capital, one could argue that the longer the
9 time horizon for the option-implied betas, the better. However, the limitation on the
10 forecasting horizon is always set by the longest expiration period of the options currently
11 traded in the market. Some companies trade options with expiration periods up to 2 or 3
12 years into the future. As evidenced by the exhaustive option data in my working papers,
13 the maximum expiration period for the options of the companies in my Nowak Proxy
14 Group is approximately 8 months. None of the 11 companies ever trade options with
15 expiration periods of more than 8 months. New options are issued roughly every 3 months
16 for all of these companies, so the maximum expiration period on any given trading day is
17 somewhere between 5 and 8 months. For consistency across companies in my proxy group
18 and across dates within the 3-month period on which my analysis is focused (February
19 through April 2026), I chose to use 6 months for the time horizon of my option-implied
20 betas. If the maximum expiration period for the options of a given company on a given

⁴⁸ Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, *Forward-Looking Betas*, p. 24 (April 25, 2008) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=891467.

1 day is less than 6 months, I use the maximum expiration period as an approximation for
2 the target 6-month horizon.

3 Simply because some may argue that it may be preferable to use longer time
4 horizons in place of or in addition to a 6-month horizon, it does not mean that a 6-month
5 option-implied beta is of no relevance or cannot be used. That would be tantamount to
6 saying you cannot use a 1-year Value Line Earnings Per Share estimate, or that the
7 minimum relevant forecast is 2 or 3 years. In fact, for purposes of option-implied betas, it
8 would be difficult to say if a time horizon of 1 year, for instance, is necessarily always
9 better than a time horizon of 6 months. An option-implied forward-looking beta, even with
10 a time horizon of less than 6 months, is still a useful tool in interpreting the current
11 expectations of investors at any given time, this is why it is one of the many tools I consider
12 when arriving at my recommendations.

13 A final strong argument in support of using 6-month option-implied betas in a cost
14 of capital calculation looking years into the future is that the authors of the paper on which
15 I based my option-implied betas concluded that their predictive powers are not limited to
16 6 months into the future.⁴⁹ In fact, they conclude that 6-month option-implied betas have
17 stronger predictive power than 6-month, 1-year, or 5-year historical betas when attempting
18 to forecast betas 1 or 2 years into the future.

⁴⁹ This is further expanded upon in my testimony starting on page 101.

Market Risk Premium

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE EQUITY RISK PREMIUM USED IN YOUR CAPM.

A. Traditionally, the risk premium used in CAPM calculations is derived from historical returns and/or equity analyst projections. The former approach is historically accurate but does not take into account investors' expectations for future market risks and returns. The latter approach is based on analyst projections, which are not appropriate since they do not reflect current investor expectations. A superior market-based way to calculate the equity risk premium is to use option-implied return expectations, which is the approach I have used.

My equity risk premium is the expected return on the S&P 500 minus the risk-free rate. I calculate an expected return on the S&P 500 by using stock options traded on this index. To begin with, I use exactly the same methodology used by the Chicago Board of Options Exchange to filter stock option data and calculate option-implied volatility and skewness,⁵⁰ as described in detail in the Beta section on page 45. The volatility and skewness calculated in this way describe a probability distribution representing the possible trajectories for the S&P 500 implied by the options market. The resulting skewed probability distribution can be closely approximated by a log-normal distribution using established statistical formulas, which then make it straightforward to calculate the expected growth for the S&P 500 for any given cumulative probability. A cumulative probability of 50% represents the median of the probability distribution, or the option-

⁵⁰ As used in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

1 implied market consensus, which is how I arrive at my calculation of expected market
2 growth.

3 Once the option-implied growth rate of the S&P 500 has been estimated as
4 described above, I add the dividend yield and subtract the risk-free rate to arrive at the
5 market risk premium, as laid out in Exhibit ALR-4, page 4 and Exhibit ALR-4, page 6. In
6 line with my Spot and Weighted Average CAPM approaches, I use both spot values as of
7 April 30, 2026, and weighted averages over the 3 months ending on that date for option-
8 implied growth, dividend yields, and short- and long-term risk-free rates in these
9 calculations to arrive at a total of 4 estimated values for the market risk premium. The
10 market risk premia I use in my Weighted Average CAPM analysis with short- and long-
11 term risk-free rates are 5.48% and 4.30%, respectively. The market risk premia I use in
12 my Spot CAPM analysis with short- and long-term risk-free rates are 5.24% and 3.94%,
13 respectively.

14 **Q. DID YOU TAKE INTO CONSIDERATION THE DIFFERENCE IN**
15 **VOLATILITIES ACROSS EXPIRATION PERIODS IN THE OPTIONS TRADED**
16 **ON THE S&P 500?**

17 **A.** Yes. The volatility implied by the options market changes over time as investors'
18 perception of risk changes. For example, during a crisis, implied volatility generally
19 increases as investors expect that stock market prices have a greater chance of large swings
20 compared to times when there is no crisis. As discussed earlier, investors also often have
21 different volatility expectations over different time periods. For example, on any given
22 day, investors might expect volatility to be relatively high over the next 30 days and to
23 decrease over the next year or longer. The same holds true for skewness, even though it is

less intuitive to understand changes in skewness than in volatility. Because of these changes across option expiration periods, I take a weighted average of the entire term structure of the option-implied volatility and skewness, which for the S&P 500 typically goes out to 54 to 61 months⁵¹, interpolating where necessary, and giving the most weight to the option expiration period of 12 months.

CAPM Results

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR CAPM.

A. Table 6 and Table 7 below show the results of my Weighted Average CAPM and Spot CAPM Analyses, respectively.

Weighted Average CAPM

TABLE 6: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY				
WEIGHTED - All Inputs Weighted From February to April 2026				
	3-Month Treasury Bill		30-Year Treasury Bond	
	Historical Blended Beta	Forward Beta	Historical Blended Beta	Forward Beta
Risk-Free Rate	3.68%	3.68%	4.86%	4.86%
Beta	0.44	0.58	0.44	0.58
Risk Premium	5.48%	5.48%	4.30%	4.30%
CAPM	6.12%	6.88%	6.77%	7.37%

Source: Exhibit ALR-4, page 1

⁵¹ Prior to November 2021, the longest expiration period for stock options traded on the S&P 500 was 36 months.

Spot CAPM

TABLE 7: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY (SPOT)				
SPOT - All Inputs Based on Last Available Data as of April 30, 2026				
	3-Month Treasury Bill		30-Year Treasury Bond	
	Historical Blended Beta	Forward Beta	Historical Blended Beta	Forward Beta
Risk-Free Rate	3.68%	3.68%	4.98%	4.98%
Beta	0.43	0.57	0.43	0.57
Risk Premium	5.24%	5.24%	3.94%	3.94%
CAPM	5.95%	6.65%	6.68%	7.21%

Source: Exhibit ALR-4, page 5

As shown in Appendix E, the results of my CAPM analysis applied to the Nowak Proxy Group demonstrate how the cost of equity has evolved since the onset of the COVID-19 pandemic. The cost of equity briefly spiked in early 2020 but then declined as markets stabilized. Most importantly, since peaking at about 9.25% in November 2022, the CAPM-implied cost of equity for the proxy group has been on a clear downward trend, falling to under 7% by August 2025.

VI. COE OF OVERALL MARKET

Q. HOW DOES YOUR COE CALCULATION FOR THE OVERALL MARKET RELATE TO YOUR 8.03% ROE RECOMMENDATION?

A. My COE for the overall market serves as a critical ceiling for the appropriate ROE for Aquarion. It is grounded in a fundamental economic boundary: a low-risk, regulated monopoly utility cannot logically require a higher return than the riskier overall stock market.

1 Using forward-looking options data, I calculated the COE for the S&P 500 to be
2 between 9.14% and 9.87% at the 1-year investment horizon and between 7.61% and 7.96%
3 at the 5-year investment horizon, with a midpoint between the high and low of 8.74%.⁵² I
4 provide this analysis to offer direct insight into what current capital markets are indicating
5 regarding the COE for the market as a whole. These calculations should not be interpreted
6 as the COE applicable to Aquarion or any utility company and instead serve as an upper
7 bound guideline.

8 **Q. HOW DID YOU CALCULATE THE COE FOR THE OVERALL MARKET?**

9 **A.** I calculated the COE for the S&P 500 by using a DCF model. I used the prices of stock
10 options traded on the S&P 500 to derive an option-implied growth rate. As discussed
11 above, a stock option is a financial contract giving the holder the right to buy or sell a
12 security at a specified price within a set timeframe, and they are useful for calculating the
13 COE because their market prices reflect the probability distribution of future stock prices,
14 allowing for the derivation of investors' expectations. Please see Appendix G for a
15 discussion of how I calculated the option-implied growth rates.

16 **Q. WHAT ARE THE RESULTS OF YOUR DCF COE ANALYSIS?**

17 **A.** The results of our DCF models applied to the S&P 500 range between 7.61% and 10.00%.
18 To properly interpret these results, it is critical to understand that they vary across two
19 distinct dimensions: the investment horizon, or the time period over which the return is

⁵² The full range at investment horizons between 6 months and 5 years is 7.61% and 10.00%, with a midpoint of 8.80%.

1 measured, and the date of analysis, which in this case comprises the market conditions
2 averaged over the three-month period February through April 2026.

3 **Q. PLEASE EXPLAIN HOW THE COE RESULTS VARY ACROSS THESE**
4 **DIMENSIONS.**

5 **A.** My analysis reveals a dynamic term structure where COE expectations shift depending on
6 how far into the future we look.

7 The resulting option-implied COE can be summarized as follows:

8 1-Year Horizon: 9.14% to 9.87%

9 3-Year Horizon: 8.79% to 8.96%

10 5-Year Horizon: 7.61% to 7.96%

11 Generally speaking, there is a declining trend as one goes out from short-term to
12 longer-term horizons.

13 **Q. WHY DIDN'T YOU CALCULATE THE COE BEYOND THE FIVE-YEAR TIME**
14 **FRAME?**

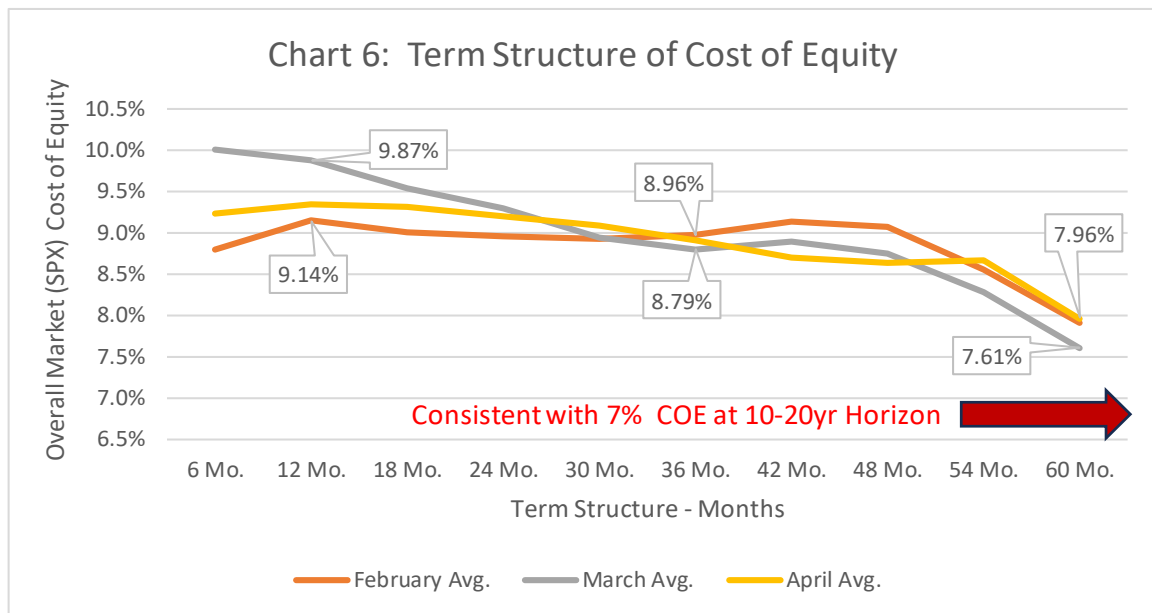
15 **A.** It is not possible to calculate an option-implied COE beyond the five-year horizon because
16 a consistent market for such options does not exist. Publicly traded index options
17 occasionally trade out to six years for a brief period, but are only available consistently out
18 to about five years.

19 **Q. WHAT CONCLUSION DO YOU DRAW FROM THIS DECLINING TREND?**

20 **A.** The data indicates that while short-term market expectations have risen in recent months,
21 longer-term expectations remain anchored at lower levels.

1 This is significant because, for utility ratemaking purposes, the longer horizons are
2 arguably the most relevant. While rates are set periodically, the cost of equity (COE)
3 represents the return required to attract capital for long-lived assets. Because the primary
4 investors in this sector, such as pension funds, match their investments to long-term
5 liabilities, they price these securities based on a multi-decade horizon rather than shorter
6 investment horizons.

7 As shown in Chart 6 on page 56, as we extend the timeline out to five years, the
8 COE indicated by our stock option analysis is consistent with the longer-term forecasts of
9 major financial institutions. Specifically, even the highest COE results in Chart 6 decline
10 from 9.87% at the 1-year horizon to 7.96% at the 5-year horizon, trending directly toward
11 the 10-to-20-year forecasts from firms like J.P. Morgan (6.7%) and the Horizon Actuarial
12 Survey (approximately 7.0%), as shown in Table 3 on page 11. As discussed above, the
13 Horizon survey is a significant industry benchmark that aggregates the capital market
14 assumptions of 41 different investment advisory firms, including the Bank of New York
15 Mellon, BlackRock, and Goldman Sachs.



While this market-wide COE analysis does not directly dictate my ROE recommendation, it provides a critical benchmark for reasonableness. Specifically, it confirms that my recommended ROE of 8.03% is consistent with, and provides a modest, risk premium above, a broad cross-section of long-term institutional forecasts for the broader equity market. Notably, my 8.03% recommendation remains slightly below the 8.74% midpoint I calculated for the S&P 500. Chart 6 above shows the equity return expectations/COE for the S&P 500 over longer investment horizons are mostly around 8%.

VII. EVALUATION OF AQUARION'S RATE OF RETURN TESTIMONY

Q. PLEASE SUMMARIZE THE TESTIMONY OF MR. NOWAK.

A. Mr. Nowak recommends an authorized ROE of 10.20% for Aquarion. In his testimony, he evaluates the appropriateness of the Company's proposed capital structure and considers the risks Aquarion faces compared to the companies in his proxy group, including its planned capital expenditure program and the regulatory environment in Connecticut.

1 Regarding his specific calculations, Mr. Nowak states that his quantitative analyses
2 produce a cost of equity range of 9.73% to 11.49%. From within that range, he notes that
3 "considering the Company's risk profile and flotation costs," he recommends an ROE of
4 10.20%. He ultimately goes below the 10.61% midpoint of his range, characterizing his
5 10.20% recommendation as a "conservative estimate" of Aquarion's cost of equity.

6 Mr. Nowak arrived at his 10.20% recommendation based on the results of:

- 7 • Constant Growth Discounted Cash Flow (DCF) Model
- 8 • Capital Asset Pricing Model (CAPM)
- 9 • Expected Earnings Analysis⁵³

10 According to his testimony, these models produced cost of equity estimates ranging
11 from 9.73% to 11.49%. Mr. Nowak also discusses Aquarion's capital structure, comparing
12 it to his proxy group. He does not propose any explicit changes to the Company's requested
13 54.83% equity ratio, concluding it is reasonable because it is "within the range of actual
14 common equity ratios of 46.51 percent to 60.16 percent for the operating companies held
15 by the proxy group over this period and generally consistent with the proxy group average
16 of 54.26 percent."⁵⁴

17 His testimony emphasizes that no single model should be relied upon exclusively
18 to determine the ROE, arguing that strict adherence to any one approach "can lead to flawed
19 conclusions." He acknowledges that "no model can exactly pinpoint the correct cost of
20 equity," and explicitly states that the results of his models "cannot be mechanically applied

⁵³ Mr. Nowak's Direct Testimony, page 26, lines 14-16.

⁵⁴ Mr. Nowak's Direct Testimony, page 50, lines 15-18.

without also using informed judgment.” Consequently, selecting his specific 10.20% ROE recommendation from within his analytical range relies on this subjective judgment.

TABLE 8: MR. NOWAK'S COST OF EQUITY RESULTS	
METHOD	Recommended Ranges (Median to Average)
Constant Growth DCF	10.48% - 11.00%
CAPM	10.46% - 11.49%
Average	10.95% - 11.23%
Other Benchmark Analyses	
Expected Earnings	9.73% - 10.51%
Mr. Nowak's Average Cost of Equity Model Results	9.73% - 11.49%

[1] Mr. Nowak's Direct Testimony, Figure 1, page 4 of 52

Q. IS MR. NOWAK'S 10.20% ROE MARKET-BASED?

A. No. Mr. Nowak says that the ROE is a “market-based concept.”⁵⁵ But when applying his approaches, there are key places where he fails to use market data. For example, the market risk premium portion of his CAPM are based on analyst EPS growth rate forecasts that are as high as 65.5%.⁵⁶ His reliance on equity analyst forecasts earnings and economist interest rate forecasts is problematic for at least the following two reasons. He does not rely on market data nearly as much as he could. His models are based on the speculations of individual analysts instead of the expectations over the millions of investors that purchase stocks, bonds, and stock options (i.e., the overall market).

⁵⁵ Mr. Nowak's Direct Testimony, page 23, line 8.

⁵⁶ Mr. Nowak's Direct Testimony, Exhibit A-8-JCN-6, Page 4 of 14.

1 **Q. DO THE RESULTS OF MR. NOWAK’S COST OF EQUITY MODELS PROVIDE**
2 **A RELIABLE INDICATION OF AQUARION’S COST OF EQUITY?**

3 **A.** No. Mr. Nowak’s 10.20% ROE recommendation is significantly higher than Aquarion’s
4 market-based cost of equity. If his recommendation is used to set rates, consumers will be
5 significantly overcharged. Mr. Nowak’s 10.20% ROE recommendation is excessive
6 largely because his COE calculations are based on a flawed analytical approach and an
7 inappropriate definition of the cost of equity, despite defining it correctly in portions of
8 filed testimony.

9 Additionally, each of his COE models have specific issues that contribute to his
10 unreasonably high results. First, I will address how his constant growth DCF method is
11 unreliable because it mechanically uses analyst 5-year EPS growth rates as a proxy for
12 growth without considering the mathematical relationship between retention rates,
13 dividend payments, and growth. A company cannot invest and grow with money it has
14 paid out to investors as a dividend. Second, I will explain how his CAPM overstates the
15 cost of equity by using an equity risk premium that is not reflective of investors’
16 expectations as indicated by market data. Third, I will explain that his Expected Earnings
17 Approach should be disregarded because it is based on projected accounting returns,
18 instead of market returns.

19 **DCF Method**

20 **Q. PLEASE DESCRIBE MR. NOWAK’S DCF METHOD.**

21 **A.** As noted above, one of the cost of equity models Mr. Nowak used to derive his 10.20%
22 ROE recommendation was a variation of the Constant Growth Discounted Cash Flow

(DCF) model. His 9.78% to 11.70% result was based on market data—stock prices, dividend yields and analyst growth rate projections—from his proxy group, which is the same proxy group I utilized in my cost of equity analysis. His model is based on the mathematical formula:

$$k = \frac{D(1 + g)}{P_0} + g$$

Where:

k: required return;
*P*₀: current *stock price*;
D: current *dividend*;
g: expected *growth rate*.⁵⁷

Key Inputs and Assumptions: Mr. Nowak used average stock prices over the following three different trading periods: 30-day, 90-day, and 180-day. He explained that this approach helps balance capturing recent market conditions while avoiding potential distortions from short-term fluctuations.⁵⁸

Dividend Yield Adjustments: He calculated the unadjusted dividend yield using each company’s annualized dividend per share as of December 31, 2025, divided by the average stock price. To account for expected dividend growth, he applied one-half of the expected annual dividend growth rate to adjust the yield upward.

Growth Rate Estimation: Mr. Nowak used consensus analyst five-year EPS growth estimates from three sources:

- Value Line,
- S&P Capital IQ, and

⁵⁷ Mr. Nowak’s Direct Testimony, page 27, lines 8-12.

⁵⁸ Mr. Nowak’s Direct Testimony, page 28, lines 11-17.

- Zacks Investment Research.

His rationale for focusing on EPS growth is based on the Constant Growth DCF model's assumption that earnings, dividends, and book value per share all grow at the same constant rate. He argues that over the long term, 'dividend growth can only be sustained by earnings growth,' making long-term EPS forecasts from credible sources the appropriate measure for the DCF model

Calculation of Mean and Median Results: Mr. Nowak computed mean and median DCF results across his proxy group using different growth rate assumptions:

- Mean High: The highest EPS growth rate estimate was combined with the expected dividend yield for each of the proxy groups.
- Mean Low: The lowest EPS growth rate estimate was used.
- Overall Mean: The average EPS growth rate from all sources was applied.

DCF Model Results: The results of Mr. Nowak's Constant Growth DCF model are presented in Figure 9 on page 31 of 52 of his testimony, showing a range of cost of equity estimates of 9.78% to 11.70%. These results provided a range of DCF estimates that contributed to his overall ROE recommendation of 10.20%.

Q. DOES MR. NOWAK PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Mr. Nowak explains that the constant growth DCF is based on the assumption that the average growth rate for earnings and dividends is constant, the dividend payout ratio is stable, there is a constant price-to-earnings multiple, and the discount rate is greater than

1 expected growth rate.⁵⁹ His DCF method contradicts his own description of how the
2 constant growth model should be implemented, however. His growth estimate relies on
3 analyst five-year EPS growth forecasts.⁶⁰ The correct application of the DCF method
4 requires that the dividend yield be computed properly, and that the growth rate used be
5 derived from a careful study of what future *sustainable* growth in cash flow is anticipated
6 by investors. Major financial institutions like J.P. Morgan Chase have used the sustainable
7 growth DCF model, as I do. The approach outlined by J.P. Morgan in its long-term capital
8 market assumptions takes a more comprehensive view, integrating multiple interrelated
9 financial factors to build expected returns. Their methodology is designed to “tie together
10 complex interrelationships” and ensure consistency between expected earnings, future
11 book value, and sustainable growth rates.⁶¹

12 In contrast to Mr. Nowak’s overly simplistic DCF approach, J.P. Morgan’s
13 framework breaks equity returns into fundamental drivers, including:

- 14 1. aggregate revenue growth,
- 15 2. earnings growth as a function of margins,
- 16 3. earnings per share (EPS) growth after accounting for dilution,
- 17 4. valuation impacts on price return, and
- 18 5. dividends as a component of total return.

19 This approach ensures that factors such as retained earnings, share dilution, and
20 payout ratios remain aligned with expected book equity growth—a consideration absent in

⁵⁹ Mr. Nowak’s Direct Testimony, page 27, lines 13-16 and page 28, lines 1-2.

⁶⁰ Mr. Nowak’s Direct Testimony, page 29, lines 4-7.

⁶¹ 23rd Annual Edition, Long-Term Capital Market Assumptions - Time-tested projections to build stronger portfolios, pages 62-63.

Mr. Nowak's Expected Earnings model. As J.P. Morgan explains, these interrelationships must be considered to develop reliable estimates of future returns, whereas a simplistic reliance on analyst EPS growth forecasts (as in Mr. Nowak's method) overlooks these complexities.⁶²

Mr. Nowak's approach may overstate or misrepresent the true cost of equity by failing to account for the broader structural dynamics that drive long-term investor return expectations. Please see Appendix C for explanation of why a future-oriented "B X R" method, which is nearly identical to the method used by J.P. Morgan, is superior to Mr. Nowak's DCF method.

CAPM Method

Q. PLEASE DESCRIBE MR. NOWAK'S CAPM METHOD.

A. Mr. Nowak explains that the CAPM method "estimates the cost of equity for a given security as a function of a risk-free return plus a risk premium (to compensate investors for the non-diversifiable or 'systematic' risk of that security)."⁶³ he says that this method is defined by the following four components:

$$K_e = r_f + \beta (r_m - r_f)$$

Where:

K_e	=	the required ROE for a given security;
β	=	Beta coefficient of an individual security;
r_f	=	the risk-free rate of return; and
r_m	=	the required return on the market as a whole. ⁶⁴

⁶² *Id.*

⁶³ Mr. Nowak's Direct Testimony, page 32, lines 13-15.

⁶⁴ Mr. Nowak's Direct Testimony, page 32, lines 4-14.

1 **Q. WHAT RISK-FREE RATE DOES MR. NOWAK USE IN HIS CAPM?**

2 **A.**He uses the following three risk-free rates: (1) current 30-day average yield on 30-year
3 Treasury bonds (4.77%), (2) projected (Q2 2026 through Q2 2027) yield 30-year Treasury
4 bonds (4.68%), and (3) projected (between 2027 and 2031) yield 30-year Treasury bonds
5 (4.60%).⁶⁵

6 **Q. WHAT BETA COEFFICIENT DOES MR. NOWAK USE IN HIS CAPM?**

7 **A.**he uses the following two historical beta coefficients: (1) Bloomberg 10-year weekly return
8 relative to the S&P 500 index, and (2) Value Line 5-year historical weekly return relative
9 to the New York stock exchange composite index.⁶⁶

10 **Q. WHAT RISK PREMIUM DOES MR. NOWAK USE IN HIS CAPM?**

11 **A.**Mr. Nowak uses a “forward-looking” market risk premium⁶⁷ in his CAPM analysis using
12 the following two methodologies:

13 1. **The FERC Method:**

- 14 • This method estimates the expected market return at 11.76% using a Constant
15 Growth Discounted Cash Flow (DCF) model applied to the S&P 500 Index.⁶⁸
- 16 • As discussed above, Mr. Nowak uses risk-free rates between 4.60% and 4.77%,⁶⁹
17 resulting in market risk premiums between 6.99% and 7.16%.⁷⁰

⁶⁵ Mr. Nowak’s Direct Testimony, page 33, lines 8-12.

⁶⁶ Mr. Nowak’s Direct Testimony, page 33, lines 13-16 and page 34, lines 1-2.

⁶⁷ Mr. Nowak’s Direct Testimony, page 5, line 9.

⁶⁸ Mr. Nowak’s Direct Testimony, page 34, lines 3-17.

⁶⁹ Mr. Nowak’s Direct Testimony, page 33, lines 8-12.

⁷⁰ Mr. Nowak’s Direct Testimony, Exhibit A-8-JCN-7, pages 1-4 of 4.

- The FERC method filters out companies with exceptionally high projected growth rates (above 20%), which reduces the estimated market return and results in a more conservative risk premium.

2. The "Forward-Looking" Market Risk Premium Approach:

- This approach also applies a Constant Growth DCF model to the S&P 500 but does not exclude high-growth companies.
- The expected market return is 15.95%. To arrive at this result, Mr. Nowak uses risk-free rates between 4.60% and 4.77%, resulting market risk premiums between 11.18% and 11.35%.⁷¹

Because this method includes all companies regardless of growth rate, it produces a higher risk premium estimate compared to the FERC method.

Q. DOES MR. NOWAK USE AN APPROPRIATE RISK-FREE RATE IN HIS CAPM?

A. In principle, no. As discussed below, when selecting a security to estimate the risk-free rate, it is important to choose one with a beta coefficient as close to zero as possible because, by definition, the risk-free rate in the CAPM model should have no correlation with market movements. This is where the 30-year Treasury bond yield falls short, as it has an established non-zero beta, meaning it does not behave as a truly risk-free asset. In contrast, the 3-month Treasury bill yield has a considerably lower beta, making it a superior choice for estimating the risk-free rate.

Additionally, 30-year U.S. Treasury bonds are not truly risk-free. Holding a long-term Treasury bond exposes investors to interest rate risk throughout its life. The collapse

⁷¹ Mr. Nowak's Direct Testimony, Exhibit A-8-JCN-7, pages 1-4 of 4.

1 of Silicon Valley Bank (SVB) in 2023 underscores this risk. As interest rates rose sharply,
2 the market value of SVB's bond portfolio fell by over \$17 billion, leaving the bank with
3 substantial unrealized losses. When depositors attempted to withdraw \$42 billion in a
4 single day, SVB lacked the liquidity to meet these demands, in part because it could not
5 hold its bonds to maturity without realizing those losses.⁷² This contributed to SVB's
6 downfall, demonstrating that long-term Treasury bonds carry significant risk and may not
7 be the best proxy for the risk-free rate in CAPM calculations.

8 As outlined in Exhibit ALR-4, page 2, my spot and weighted average short-term
9 risk-free rates are 3.68% and 3.68%, respectively. My spot and weighted average long-
10 term risk-free rates are 4.98% and 4.86%, respectively. These four rates average 4.30%.
11 The risk-free rate component of Mr. Nowak's CAPM analysis range between 4.60% and
12 4.77%.⁷³

13 Mr. Nowak's use of interest rate forecasts to determine the risk-free rate is flawed
14 in principle because current market yields on U.S. Treasury bonds already reflect investor
15 expectations. As discussed above, Aquarion's authorized ROE should be based on market
16 data, since investors provide the capital. While in this case, his use of forecasts does not
17 artificially inflate his CAPM results, his approach introduces unnecessary subjectivity and
18 could lead to inaccurate cost of equity estimates (either too high or too low) under different
19 capital market conditions. Therefore, his CAPM methodology should not be used to set
20 rates in future Connecticut proceedings.

⁷² What Happened With Silicon Valley Bank? - WSJ, March 14, 2023.

⁷³ Mr. Nowak's Direct Testimony, page 33, lines 8-12.

1 **Q. DO MR. NOWAK'S BETA COEFFICIENTS OVERSTATE THE COST OF**
2 **EQUITY?**

3 **A.** Yes. Mr. Nowak's CAPM results are not a reliable indicator of the cost of equity because
4 he uses historical beta coefficients. His Bloomberg 10-year and Value Line 5-year
5 historical betas he uses in his CAPM analysis are excessive, averaging 0.72 and 0.76.⁷⁴
6 Over the past 3 months, my forward-looking option-implied betas have had a weighted
7 average of 0.58.⁷⁵ and my 6-month and 2-year historical betas for the Nowak Proxy Group
8 have had a weighted average of 0.351 and 0.467, respectively, over the past 3 months.⁷⁶

9 **Q. DO YOU BELIEVE MR. NOWAK'S EQUITY RISK PREMIUM PORTION OF**
10 **MR. NOWAK'S CAPM ANALYSIS IS REASONABLE?**

11 **A.** No, I believe Mr. Nowak's market risk premium components between 6.99% and 7.16%
12 (FERC method)⁷⁷ and 11.18% and 11.35% (all companies in S&P 500)⁷⁸ are excessive and
13 lead to an inflated CAPM result. As explained in the CAPM section starting on page 33, I
14 determined that investors are demanding a significantly lower equity risk premium of
15 between 3.94% and 5.48%.⁷⁹

16 This conclusion is supported by prominent valuation authorities who arrive at
17 figures substantially lower than Mr. Nowak's. For example, Professor Aswath Damodaran
18 from NYU (who finds an equity risk premium (trailing 12-month, adjusted payout) of

⁷⁴ Mr. Nowak's Direct Testimony, Exhibit A-8-JCN-7, pages 1-4 of 4.

⁷⁵ Exhibit ALR-4, page 3.

⁷⁶ Exhibit ALR-4, page 3.

⁷⁷ Mr. Nowak's Direct Testimony, Exhibit A-8-JCN-7 pages 1-4 of 4.

⁷⁸ *Id.*

⁷⁹ Exhibit ALR-4, page 1 and Exhibit ALR-4, page 5.

1 4.15% as of May 1, 2026),⁸⁰ and further supports the argument that Mr. Nowak equity risk
2 premium estimation is excessively high.

3 Additionally, based on calculations by P. Brett Hammond⁸¹ and Martin L.
4 Leibowitz⁸², which were based on a literature survey and estimates from participants in the
5 Equity Risk Premium Forum, they found the most frequent estimate of the 10-year equity
6 risk premium to be 4%.

7 The authors of *Revisiting the Equity Risk Premium* noted “Despite radically
8 different market environments, it is striking that the estimates in all three forums were so
9 similar. They tended to be in the 3%–5% range, and notably, in comparison to historical
10 returns, none of them included estimates above 7% or below zero.” The three forums were
11 in 2001, 2011, and 2021.⁸³

12 In summary, Mr. Nowak’s CAPM results are unreasonably high, because his equity
13 risk premium component is above current market-based indicators, in comparison to my
14 own analysis which is based on stock option prices and the conclusions of prominent
15 research.

⁸⁰ Aswath Damodaran, PhD., Stern School of Business, New York University, *Damodaram Online*, at <https://pages.stern.nyu.edu/~adamodar/>.

⁸¹ P. Brett Hammond is a Research Professional at the Capital Group and a former Managing Director and Chief Investment Strategist at TIAA-CREF. He has authored numerous studies on asset allocation and retirement security and serves as a Research Fellow for the CFA Institute Research Foundation.

⁸² Martin L. Leibowitz is the President of Advanced Portfolio Studies LLC and a former Vice Chairman and Chief Investment Officer of TIAA-CREF. A widely recognized authority on fixed-income analysis and portfolio strategy, he has authored several seminal books on finance, including *Inside the Yield Book*, and is a recipient of numerous awards from the CFA Institute.

⁸³ P. Brett Hammond & Martin L. Leibowitz, CFA Institute Research Foundation, *Revisiting the Equity Risk Premium, Introduction: Three Decades of Equity Risk Premium Forums*, p. vi, (2023) available at <https://www.cfainstitute.org/-/media/documents/article/rf-brief/Revisiting-the-Equity-Risk-Premium.pdf>.

1 **Q. DO MR. NOWAK’S CAPM RESULTS OVERSTATE THE COE BECAUSE THE**
2 **MARKET RISK PREMIUM PORTION OF HIS ANALYSIS IS HIGHER THAN**
3 **INVESTORS’ EXPECTATIONS?**

4 **A.** Yes. Mr. Nowak’s CAPM uses a market risk premium of 6.99% to 11.35%⁸⁴ based on an
5 expected market return on the S&P 500 of 11.76% to 15.95%.⁸⁵ The equity risk premium
6 portion of my CAPM, which is based directly on a measure of investors’ expectations, is
7 significantly lower than Mr. Nowak’s. The market risk premia I use in my Weighted
8 Average CAPM analysis with short- and long-term risk-free rates are 5.48% and 4.30%,
9 respectively.⁸⁶ The market risk premia I use in my Spot CAPM analysis with short- and
10 long-term risk-free rates are 5.24% and 3.94%, respectively.⁸⁷

11 **Expected Earnings Analysis**

12 **Q. PLEASE DESCRIBE MR. NOWAK’S EXPECTED EARNINGS ANALYSIS.**

13 **A.** Mr. Nowak’s Expected Earnings analysis estimates the cost of equity based on projected
14 return on book equity (ROE) for his selected proxy group. This method relies on
15 accounting-based measures of profitability rather than market-based measures of investor-
16 required returns.⁸⁸

17 To perform his analysis, Mr. Nowak uses Value Line’s projected ROEs for the
18 proxy group companies for the period 2028 to 2030.⁸⁹ Since Value Line reports ROEs

⁸⁴ Mr. Nowak’s Direct Testimony, Exhibit A-8-JCN-7, pages 1-4 of 4.

⁸⁵ Mr. Nowak’s Direct Testimony, page 34, lines 3-17.

⁸⁶ Exhibit ALR-4, page 1.

⁸⁷ Exhibit ALR-4, page 5.

⁸⁸ Mr. Nowak’s Direct Testimony, page 36, lines 6-9.

⁸⁹ Mr. Nowak’s Direct Testimony, page 36, 10-16,

1 based on common shares outstanding at the end of the period, he adjusts these figures to
2 reflect average shares outstanding over the entire forecast period.

3 Based on his calculations, Mr. Nowak's Expected Earnings analysis produces an
4 average ROE of 10.51% and a median ROE of 9.73% for the proxy group.⁹⁰ He claims that
5 this method provides a useful benchmark for assessing the cost of equity and is consistent
6 with the basic tenants of *Hope* for setting an authorized ROE.⁹¹

7 **Q. IS THIS METHOD VALID?**

8 **A.** No. Mr. Nowak's Expected Earnings analysis is flawed because it does not measure the
9 cost of equity demanded by investors in the market. Instead, it relies on projected
10 accounting returns on book equity, which are not the returns that investors receive on their
11 investments.

12 As Mr. Nowak acknowledges, The United States Supreme Court, in *Hope*, made
13 clear that "the return to the equity owner should be commensurate with returns on
14 investments in other enterprises having corresponding risks."⁹² Investors earn returns on
15 the market price of a stock, not its book value. Since investors cannot buy shares at book
16 value, accounting-based ROEs do not represent the forward-looking return required in
17 competitive capital markets.

⁹⁰ Mr. Nowak's Direct Testimony, page 4, line 1.

⁹¹ Mr. Nowak's Direct Testimony, page 36, lines 3-9.

⁹² Mr. Nowak's Direct Testimony, page 7, lines 12-13.

Business and Financial Risks

Q. HOW DOES MR. NOWAK JUSTIFY HIS CLAIM THAT AQUARION FACES HIGHER BUSINESS RISKS THAN HIS PROXY GROUP?

A. In the Business and Financial Risks portion of Mr. Nowak’s testimony, he addressed the following three factors:

A. Capital Expenditure Program: Mr. Nowak attempts to justify a higher ROE by arguing that Aquarion's planned capital investment program of over the 2026-2030 period affects the Company's risk profile in two significant and related ways: first, “the heightened level of investment increases the risk of under-recovery or delayed recovery of invested capital;” and second, “an inadequate return would put downward pressure on key credit metrics.”⁹³ He argues that the absolute level of investment required will put pressure on the Company's ability to raise capital, and that the terms on which it does so will have lasting impacts for customers. To support the credit implications of this argument, he cites S&P's observation that regulatory support for large capital projects is an important credit consideration, and Moody's acknowledgment that Aquarion's elevated capital expenditure program is a credit challenge that will require additional debt issuances. To distinguish Aquarion from the proxy group, he compares the ratio of projected capital expenditures to net utility plant, claiming that Aquarion's ratio exceeds that of every proxy group company as well as the proxy group median of approximately 53 percent. He

⁹³ Mr. Nowak’s Direct Testimony, page 38, lines 4-10.

1 ultimately concludes that the authorized ROE must be set at a level that allows
2 Aquarion to continue attracting both debt and equity on favorable terms
3 across a variety of economic and financial market conditions.

4 **B. Regulatory Risk:** Mr. Nowak attempts to justify a higher ROE by arguing
5 that Connecticut's regulatory environment significantly increases Aquarion's
6 risk profile relative to the proxy group and restricts its ability to attract capital.
7 He relies on Regulatory Research Associates (“RRA”) rankings to establish
8 that Connecticut currently holds RRA's lowest rating of Below Average / 3,
9 shared only with Maryland, and contrasts this with the proxy group, where 36
10 of 47 ranked jurisdictional operations are rated Average or Above Average
11 and only two are ranked as low as Connecticut. He argues this regulatory
12 environment directly harms the Company's financial integrity, citing Moody's
13 2024 credit downgrade to Baa1, which he attributes primarily to PURA's
14 previous rate order authorizing an ROE of 8.70 percent. He further notes that
15 Aquarion has previously underearned its authorized return, earning
16 approximately 5.44 to 5.67 percent against its authorized ROE of 8.70 percent
17 in recent years, and that these earned returns have fallen below the prevailing
18 cost of utility debt for similarly rated companies. He argues that because
19 Aquarion must compete for capital both externally in the market and
20 internally against Eversource Energy's operations in other jurisdictions, an
21 authorized ROE below that of comparable utilities could cause discretionary
22 capital to be directed elsewhere. He ultimately concludes that the current
23 regulatory construct fails both the *Hope* doctrine and Connecticut General

1 Statutes §16-19e(a), claiming that a higher authorized ROE is necessary to
2 prevent further credit deterioration and allow Aquarion to successfully
3 compete for investment.

4 **C. Flotation Costs: Mr. Nowak** recommends a 7-basis-point upward
5 adjustment to his recommended ROE to account for flotation costs. Because
6 Aquarion does not issue its own publicly traded stock, he derives this
7 adjustment from the historical issuance costs of its parent company,
8 Eversource Energy. He argues that because flotation costs are recorded on the
9 balance sheet as paid-in capital rather than expensed on the income statement,
10 the authorized ROE is the only ratemaking mechanism available for their
11 recovery, and that denying this adjustment would leave Aquarion's authorized
12 return insufficient and dilute equity share value. To support his claims, he
13 points to Eversource's plans to raise \$800 million to \$1.1 billion in equity
14 between 2026 and 2030. He also cites a 2021 PURA decision involving
15 Connecticut Water as precedent for recognizing parent-level issuance costs at
16 the subsidiary level, noting that Connecticut Water's parent SJW Group
17 similarly passes flotation costs down to the operating utility

18 **Q. DO YOU AGREE WITH MR. NOWAK'S ASSESSMENT THAT AQUARION'S**
19 **CAPITAL EXPENDITURE PROGRAM AND THE CONNECTICUT**
20 **REGULATORY ENVIRONMENT WARRANT A HIGHER ROE?**

21 **A.** No. Mr. Nowak frames capital spending and regulatory oversight as risks that require an
22 inflated return to attract capital. However, Eversource's own investor presentations
23 contradict this narrative. While utility companies often frame capital spending to regulators

1 as strict necessities for safety, reliability, and survival, Eversource markets these exact
2 capital expenditures to Wall Street not as risks, but as a driver of earnings growth.⁹⁴

3 **Q. DOES EVERSOURCE'S INVESTOR PRESENTATION PROVIDE INSIGHT**
4 **INTO ITS ACTUAL MOTIVATIONS FOR ITS CAPITAL SPENDING AND ROE**
5 **REQUESTS?**

6 **A.** Yes. In its Q1 2026 Earnings Report, the Company explicitly advertises a "Robust capital
7 investment plan of \$26.5 billion through 2030".⁹⁵ Crucially, Eversource lists this massive
8 capital deployment as a primary driver to achieve its "5% - 7% Long-Term EPS Growth"
9 target.⁹⁶ This demonstrates that the Company views capital expenditures fundamentally as
10 an engine for earnings per share (EPS) growth. Requesting an inflated 10.20% ROE is not
11 about basic capital attraction; it is about increasing earnings at the expense of Connecticut
12 ratepayers.

13 **Q. DOES PURA HAVE AN OBLIGATION TO PLEASE INVESTORS AND CREDIT**
14 **RATING AGENCIES AT ALL COST?**

15 **A.** No. Because Aquarion operates as a regulated monopoly, the natural price-disciplining
16 pressures of a competitive market are completely absent. In this vacuum, PURA acts as a
17 surrogate for competition. This means PURA's is the only entity that can ensure that the
18 "price" of capital charged to ratepayers reflects its actual, competitive market cost. The role
19 of the Commission is not to guarantee maximum profitability, nor is it to appease investors
20 and credit rating agencies at all costs.

⁹⁴ Eversource EnergyQ1 2026 Earnings Report, Page 15.

⁹⁵ Eversource EnergyQ1 2026 Earnings Report, Page 4.

⁹⁶ Eversource EnergyQ1 2026 Earnings Report, Page 15.

1 **Q. WON'T INVESTORS AND CREDIT RATING AGENCIES REACT**
2 **NEGATIVELY IF THE COMMISSION AUTHORIZES AN ROE BELOW**
3 **AQUARION'S REQUESTED 10.20%?**

4 **A.** Yes, it is highly likely that investors will be disappointed. Investors inherently desire the
5 highest possible return on their capital, and they will naturally advocate for an ROE of
6 10.20%, or higher. In fact, investors would prefer an authorized ROE of 15% or 20%.
7 However, keeping investors happy is not the legal or economic standard for setting rates.
8 If the actual market-based cost of equity is closer to 8.25%, then granting a 10.20% ROE
9 simply to avoid upsetting Wall Street would be unfair to consumers.

10 **Q. PLEASE RESPOND MR. NOWAK'S CLAIM THAT AQUARION'S ROE**
11 **SHOULD BE INCREASED BY 0.07% TO ACCOUNT FOR FLOTATION COSTS⁹⁷.**

12 **A.** I do not agree that it is appropriate to increase Aquarion's ROE to account for flotation
13 costs because the common stock of gas companies is currently selling at a market price that
14 is over 180% above book value.⁹⁸ As a result, when new common stock is issued, the effect
15 is for the book value per share to increase. This makes selling new common stock a net
16 profit center rather than a contributor to costs. Therefore, it is not appropriate currently to
17 add any common equity flotation costs.

⁹⁷ Mr. Nowak's Direct Testimony, page 49, lines 11-18.

⁹⁸ Exhibit ALR-3, page 1.

VIII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS IN THIS CASE.

A. The Commission should reject Mr. Nowak's recommended ROE of 10.20% because it significantly exceeds Aquarion's actual COE as indicated by current market data. Instead, I recommend that the PURA set Aquarion's rates based on the following:

- An overall cost of capital of 6.30% (6.01% - 6.59%);
- An ROE of 8.03% (7.46% - 8.59%);
- A capital structure containing 50.45% common equity and 49.55% long-term debt; and
- A long-term debt cost rate of 4.54%.

These recommendations satisfy the *Hope* and *Bluefield* standards, they are grounded in current market data, provide Aquarion a reasonable opportunity to attract capital on fair terms, and protect customers from paying too much above the market-based COE.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

APPENDIX A. RATE OF RETURN COMPONENT DEFINITIONS

1
2 **Cost of Equity (COE):** My COE recommendation is my opinion of the return
3 investors require to provide equity capital to Aquarion based on current capital markets.
4 Since investors must pay the market price of a stock to make an investment, investors'
5 required returns are based on the return they expect to receive on the market price of stocks.
6 In other words, Aquarion's COE is forward-looking and "market-based." My
7 recommendation is consistent with the following legal standards set by the United States
8 Supreme Court for a fair rate of return:

9 The return to the equity owner should be commensurate with returns on
10 investments in other enterprises having corresponding risks.⁹⁹

11 And:

12 [S]ufficient to . . . support its credit and . . . raise the money necessary for
13 the proper discharge of its public duties.¹⁰⁰

14 **Cost of Debt:** My cost of debt recommendation is based on the actual cost of debt
15 paid by the utility to its sources of credit. For example, if a utility has issued a bond with a
16 3% interest rate three years ago, its authorized cost of debt should be 3%, even if interest
17 rates are currently higher or lower than 3%.

18 **Capital Structure:** Capital structure is the percentage of equity and debt that
19 makes up the finances of a utility. For example, if a utility raises \$1 million of equity capital
20 and \$1 million of debt capital, I would say it has a capital structure containing 50% equity
21 and 50% debt. My capital structure recommendation is based on my review of Aquarion's

⁹⁹ *Fed. Power Comm'n v. Hope Nat. Gas Co.*, 320 U.S. 591, 603 (1944).

¹⁰⁰ *Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of the State of W. Va.* 262 U.S. 679, 692-693 (1923).

1 justification for its requested regulatory capital structure, the capital structure ratios of other
2 water and gas utility companies, and the capital structure of Aquarion's parent, Eversource
3 Energy. As discussed below, the reported capital structure of a regulated subsidiary is often
4 not representative of how the regulated utility was financed. For example, the parent of a
5 regulated utility can report funds raised through debt financing at the holding company
6 level as equity financing on the books of its regulated utility subsidiary. Therefore, it is
7 important to make sure Aquarion's requested capital structure would not overcharge
8 consumers by including a higher common equity ratio than is appropriate.¹⁰¹

9 **Cost of Equity vs. Authorized ROE:** The COE is the market-based return
10 investors expect to earn on the market value of any given stock. In other words, the COE
11 is the return investors expect to earn on the market price of equity. As it applies to this
12 proceeding, it is the return on proxies for what investors would require to provide equity
13 capital to Aquarion. The appropriate authorized ROE is based on the Commission's
14 determination of the COE at the time of the proceeding, after reviewing the evidentiary
15 record, which incorporates investor expectations. Once the Commission issues an
16 authorized ROE, the market-based cost of equity will continue to fluctuate as capital
17 markets inevitably continue to change. The authorized ROE is based on a snapshot of the
18 COE, which is constantly changing.

19 Aquarion's authorized ROE should not be set based on authorized ROEs in other
20 proceedings. Authorized ROEs set in past proceedings are not the right benchmark for
21 Aquarion's cost of equity. They are accounting returns applied to book value, not measures

¹⁰¹ A higher common equity ratio, all else equal, results in higher rates for consumers because equity is more expensive than debt.

1 of the return investors currently require on the market value of equity. A real estate analogy
2 makes the point (Note: I discuss this same analogy in Appendix B regarding market-to-
3 book ratios): if an investor buys a property for \$100,000 and earns \$6,000 per year in rent,
4 that's a 6% return on book. If the property's market value later rises to \$200,000 with rent
5 unchanged, the return on market value falls to about 3.0%. Rent does not automatically rise
6 to preserve a 6% book return; it is set by the market. The same is true for utility stocks.
7 With market-to-book ratios well above 1.0 today, the market-based cost of equity is
8 necessarily lower than authorized book returns.

9 In his 1970 book *The Economics of Regulation: Principles and Institutions*,
10 regulatory economist Alfred Kahn wrote on why the cost of equity is lower than authorized
11 returns when market-to-book ratios are significantly above one, saying:

12 [T]he sharp appreciation in the prices of public utility stocks, to one and
13 half and then two times their book value during this period, reflected ... a
14 growing recognition that the companies in question were in fact being
15 permitted to earn considerably more than their cost of capital. ... The source
16 of the discrepancy between market and book value has been that
17 commissions have been allowing r 's [returns on equity] in excess of k
18 [market cost of equity]; if instead they had set r equal to k , or proceeded at
19 some point to do so ... the discrepancy between market and book value ...
20 would have disappeared, or would never have arisen.¹⁰²

21 **Consistency with Regulatory Principles:** Regarding claims that an ROE below
22 recent authorizations is inconsistent with regulatory principles and risks impairing access
23 to capital, I address this issue in virtually every case, and I anticipate Mr. Nowak will make
24 the same argument in his rebuttal testimony here. The flaw is equating my
25 recommendations with regulatory precedent rather than investor requirements. *Hope* and

¹⁰² Alfred Kahn, *The Economics of Regulation: Principles and Institutions*, Mass. Inst. Tech. at 48 (fn. 69), 50 (1970).

1 *Bluefield* require that the return be “commensurate with returns on investments in other
2 enterprises having corresponding risks”—that is, consistent with market-based investor
3 expectations today. They do not require regulators to match or exceed prior authorizations
4 in other states.

5 Authorized ROEs are backward-looking and become embedded in rates until the
6 next case; they do not adjust dynamically with market conditions. Basing current decisions
7 on averages of past authorizations creates a circular process that can drift out of alignment
8 with actual investor expectations. By contrast, my recommendations are grounded in
9 current capital market data—interest rates, inflation expectations, equity risk premiums,
10 and forward-looking betas. That is the proper way to satisfy *Hope* and *Bluefield*.

11 **Appropriate Rate of Return:** The appropriate Rate of Return (ROR) is based upon
12 the weighted overall cost of capital (WACC) of the current costs of debt and equity at the
13 time of this proceeding. The weighted cost rate is calculated by multiplying the capital
14 structure ratios of the sources of capital (debt, preferred equity, and common equity) times
15 their respective cost rates.¹⁰³

¹⁰³ WACC = Cost of Debt X Debt Ratio + COE X Common Equity Ratio + Cost of Preferred Equity X Preferred Equity Ratio.

APPENDIX B. MARKET-TO-BOOK RATIOS AND THE MARKET-BASED COE

The Relationship Between Market Returns and Book Returns: A market-to-book ratio significantly above one indicates that the cost of equity for water and gas utility companies is lower than the expected return on book equity. Calculating the cost of equity (investors' equity return expectations) is more complicated than calculating the return on a rental property, but the same concept applies regarding the relationship between market returns and book returns (as I also explain in Appendix A regarding authorized ROEs).

If an investor purchases an apartment for \$100,000 and expects to receive \$500 per month ($\$500 \times 12 = \$6,000$ per year) in rent, they will expect an annual return of 6% ($\$6,000 / \$100,000$) on their investment. When the investor purchases the apartment, they would record the book value as \$100,000 and the market value as \$100,000, unless they determined that the purchase price was higher or lower than the market value. If the value of the apartment increases to \$200,000, for example, the market-to-book ratio would increase to 2.0, and therefore, their return on book value would remain at about 6% while their return on the market value of the apartment would decrease to about 3.0%.

In this rental property example, an increasing market value results in a lower expected return on market (3.0%) compared to the expected return on book (6%) if the rent price remains constant. Rent prices do not increase to maintain an expected 6% return on book value; they are set by what the rental market reasonably can bear.

The same is true of utility stocks. An ROE is not established based on constant return on book (accounting) returns; it is set based on what investors in the market expect

1 that market to return. In the case of a utility stock, an increasing market value results in a
2 lower return on market for the same expected return on book. As this rental property
3 example demonstrates, there is nothing inconsistent about investors expecting a lower
4 return on the market price of an investment than on the book value of an investment. In
5 fact, with market-to-book ratios of water and gas utility companies significantly above one,
6 it would be surprising if investors expected a return on market equal, or anywhere close, to
7 the return on book.
8

APPENDIX C.CONSTANT GROWTH DCF AND FUTURE-ORIENTED “B X R” METHOD

1 **The “br” Approach to the Constant Growth DCF Model:** There are claims
2 alleging that the “br” approach to the constant growth DCF model is flawed because it
3 relies on the value of the future expected return on book equity “r” to estimate what the
4 earned return on equity should be. One common criticism is that it is not reasonable for the
5 DCF to indicate a COE (market return) that is different (lower or higher) than the expected
6 return on book equity (accounting). There are multiple reasons why this concern is
7 unfounded:

- 8 1. The constant growth form of the equation using “br” is:

$$9 \qquad k = D/P + (br + sv)$$

10 In this equation, “k” is the variable for the COE, and “r” is the future
11 expected return on equity. The COE, “k,” is not the same variable as the
12 future expected earned return on equity, “r.” In fact, there often is a large
13 difference between the two.

- 14 2. The correct value to use for “r” is the return on book equity expected by
15 investors as of the time the stock price and dividend data are used to
16 quantify the D/P term in the equation. Therefore, even if future events occur
17 that may change what investors expect for “r,” the computation of the COE
18 “k” remains correct as of the time the computation was made.
- 19 3. The ability of a commission’s ROE decision to influence future cash flow
20 expectations is not unique to the retention growth DCF approach. The five-
21 year analysts’ earnings per share growth rate is a computation that is directly

1 influenced by what earnings per share will be in 5 years. Allowed ROEs
2 impact earning – higher allowed returns lead to higher earnings growth
3 because with higher allowed returns, more earnings are available for
4 reinvestment.

5 **Sustainable Growth vs. Short-Term Earnings Changes:** While changes in the
6 actual earned returns can impact growth above and beyond whatever growth results from
7 earnings retention, large short-term changes in earnings per share caused by a perceived
8 change in the future expected earned returns are unsustainable. The new perceived earned
9 return on book equity should be part of the computation, but the one-time growth spurt to
10 get there is no more indicative of the sustainable growth required in the constant growth
11 DCF formula than the temporary negative growth that occurs when a company has a bad
12 year.

13 A future-oriented “b x r” method is superior to a five-year earnings per share growth
14 rate forecast in providing a long-term sustainable growth rate. The primary cause of
15 sustainable earnings growth is the retention of earnings. A company is able to create higher
16 future earnings by retaining a portion of the prior year’s earnings in the business and
17 purchasing new business assets with those retained earnings. There are many factors that
18 can cause short-term swings in earnings growth rates, but the long-term sustainable growth
19 is caused by retaining earnings and reinvesting those earnings. Factors that cause short-
20 term swings include anything that causes a company to earn a return on book equity at a
21 rate different from the long-term sustainable rate. Assume, for example, that a particular
22 utility company is regulated so that it is provided with a reasonable opportunity to earn 9%
23 on its equity. Should the company experience an event such as the loss of several key

1 customers, or unfavorable weather conditions, which cause it to earn only 6% on equity in
2 a given year, the drop from a 9% earned return on equity to a 6% earned return on equity
3 would be concurrent with a very large drop in earnings per share. In fact, if a company did
4 not issue any new shares of stock during the year, a drop from a 9% earned return on book
5 equity to a 6% earned return on book equity would result in a 33.3% decline in earnings
6 per share over the period.¹⁰⁴ However, such a drop in earnings would not be an indication
7 of what is a long-term sustainable earnings per share growth rate. If the drop were caused
8 by weather conditions, the drop in earnings would be immediately offset once normal
9 weather conditions return. If the drop were from the loss of some key customers, the
10 company would replace the lost earnings by filing for a rate increase to bring revenues up
11 to the level required for the company to be given a reasonable opportunity to recover its
12 cost of equity.

13 For the reasons above, changes in earnings per share growth rates that are caused
14 by non-recurring changes in the earned return on book equity are inconsistent with long-
15 term sustainable growth, but changes in earnings per share because of the reinvestment of
16 additional assets are a cause of sustainable earnings growth. The “ $b \times r$ ” term in the DCF
17 equation computes sustainable growth because it measures only the growth which a
18 company can expect to achieve when its earned return on book equity “ r ” remains in
19 equilibrium. If analysts have sufficient data to be able to forecast varying values of “ r ” in
20 future years, then a complex, or multi-stage DCF method must be used to accurately
21 quantify the effect. Averaging growth rates over sub-periods, such as averaging growth

¹⁰⁴ By definition, earned return on equity is earnings divided by book value. Therefore, whatever level of earnings is required to produce earnings of 6% of book would have to be 33.3% lower than the level of earnings required to produce a return on book equity of 9%.

1 over the first five years with a growth rate expected over the subsequent period, will not
2 provide an appropriate representation of the cash flows expected by investors in the future
3 and, therefore, will not provide an acceptable method of quantifying the cost of equity
4 using the DCF method. The choices are either a constant growth DCF, in which one growth
5 rate derived using “ $b \times r$ ” should be used, or a complex DCF method in which the cash
6 flow anticipated in each future year is separately estimated. Mr. Nowak has done neither.
7 Instead, he mechanically adds analysts’ five-year earnings per share growth rate to the
8 dividend yield.

9 **Flaws in Using Analysts' Five-Year EPS Growth Rates:** Analysts’ five-year
10 earnings per share growth rates are earnings per share growth rates that measure earnings
11 growth from the most currently completed fiscal year to projected earnings five years into
12 the future. These growth rates are not indicative of future sustainable growth rates in part
13 because the sources of cash flow to an investor are dividends and stock price appreciation.
14 While both stock price and dividends are impacted in the long run by the level of earnings
15 a company is capable of achieving, earnings growth over a period as short as five years is
16 rarely in synchronization with the cash flow growth from increases in dividends and stock
17 prices. For example, if a company experiences a year in which investors perceive that
18 earnings temporarily dipped below normal trend levels, stock prices generally do not
19 decline at the same percentage that earnings decline, and dividends are usually not cut just
20 because of a temporary decline in a company’s earnings. Unless both the stock price and
21 dividends mirror every downswing in earnings, they cannot be expected to recover at the
22 same growth rate that earnings recover. Therefore, growth rates such as five-year projected

1 growth in earnings per share are not indicative of long-term sustainable growth rates in
2 cash flow. As a result, they are not applicable for direct use in the simplified DCF method.

3 The use of five-year earnings per share growth rates directly in the DCF model is
4 also improper. A raw, unadjusted, five-year earnings per share growth rate is usually a poor
5 proxy for either short-term or long-term cash flow growth that an investor expects to
6 receive. When implementing the DCF method, the time value of money is considered by
7 equating the current stock price of a company to the present value of the future cash flows
8 that an investor expects to receive over the entire time that they owns the stock. The
9 discount rate required to make the future cash flow stream, on a net present value basis,
10 equal to the current stock price is the cost of equity. The only two sources of cash flow to
11 an investor are dividends and the net proceeds from the sale of stock at whatever time in
12 the future the investor finally sells. Therefore, the DCF method is discounting future cash
13 flows that investors expect to receive from dividends and from the eventual sale of the
14 stock. Five-year earnings growth rate forecasts are especially poor indicators of cash flow
15 growth, even over the five years being measured by the five-year earnings per share growth
16 rate number.

17 Furthermore, a five-year earnings per share growth rate is a poor indicator of five-
18 year cash dividend growth expectations. The board of directors of a company changes
19 dividend rates based upon long-term earnings expectations combined with the capital needs
20 of a company. Most companies do not decrease dividends simply because a company has
21 a year in which earnings were below sustainable trends, and similarly they do not increase
22 dividends simply because earnings for one year happened to be above long-term
23 sustainable trends. Therefore, over any given five-year period, earnings growth is

1 frequently very different from dividend growth. In order for earnings growth to equal
2 dividend growth, at a minimum, earnings per share in the first year of the five-year earnings
3 growth rate period would have to be exactly on the long-term earnings trend line expected
4 by investors. Since earnings in most years are above or below the trend line, the earnings
5 per share growth rate over most five-year periods is different from what is expected for
6 dividend growth.

7 A five-year earnings per share growth rate is also a poor indication of future stock
8 price growth. If a company happens to experience a year in which earnings decline below
9 what investors believe is consistent with the long-term trend, then the stock price does not
10 drop anywhere near as much as earnings drop. Similarly, if a company happens to
11 experience a year in which earnings are higher than the investor-perceived long-term
12 sustainable trend, the stock price will not increase as much as the earnings. In other words,
13 the P/E ratio of a company will increase after a year in which investors believe earnings
14 are below sustainable levels, and the P/E ratio will decline in a year in which investors
15 believe earnings are higher than expected. Since stock price is one of the important cash
16 flow sources to an investor, a five-year earnings growth rate is a poor indicator of cash
17 flow, both because it is a poor indicator of stock price growth over the five years being
18 examined, and because it is equally a poor predictor of dividend growth over the period.

19 **Appropriate Use of Analysts' Consensus Growth Rates:** This does not mean that
20 analysts' consensus earnings per share growth rates are useless as an aid to projecting the
21 future. Analysts' EPS growth rates are, however, very dangerous if used in a simplified
22 DCF without proper interpretation. While they are not useful if used in their "raw" form,
23 they can be very useful in computing estimates of what earned return on equity investors

1 expect will be sustained in the future, and as such, are useful in developing long-term
2 sustainable growth rates. This is exactly what I do in the application of my Constant
3 Growth DCF Analysis.
4

APPENDIX D. NON-CONSTANT GROWTH FORM OF THE DCF MODEL

1 **Annual vs. Quarterly Cash Flow Modeling:** My non-constant growth DCF model
2 uses annual expected cash flows. Although dividends are paid quarterly, I used the annual
3 model because it is easier for observers to visualize what is happening. Modeling cash
4 flows to be annual rather than when they are actually expected to occur causes a small
5 overstatement of the COE.

6 The process of changing from an annual model to a quarterly model would require
7 two changes. A quarterly model would show dividends being paid sooner and would also
8 show earnings being available sooner. A company that receives its earnings sooner, rather
9 than at the end of the year, has the opportunity to compound them. Since revenues, and
10 therefore earnings, are essentially received every day, a company that is supposed to earn
11 an annual rate of 9.00% on equity would have to earn only 8.62% if the return were
12 compounded daily.¹⁰⁵ This reduction from 9.00% to 8.62% would then be partially offset
13 by the impact of the quarterly dividend payment to bring the result of switching from the
14 simplifying annual model closer to, but still a bit below, 9.00%.

15 **The Role of Earnings and Retention Rates:** By using cash flow expectations as
16 the valuation parameter, the non-constant DCF model still relies on earnings. It relies on
17 an expectation of future cash flows. Future cash flows come from dividends during the
18 time the stock is owned and capital gains from the sale of the stock once it is sold. Since
19 earnings impact both dividends and stock price, the non-constant DCF model still relies on
20 earnings.

¹⁰⁵ $(1+.0862/365)^{365}=1.09=9.00\%$.

1 Every dollar of earnings is used for the benefit of stockholders, either in the form
2 of a dividend payment, or earnings reinvested for future growth in earnings and/or
3 dividends. Earnings paid out as a dividend have a different value to investors than earnings
4 retained in the business. Recognizing this difference and properly considering it in the
5 quantification process is a major strength of the DCF model and is why the non-constant
6 DCF model I have set forth is an improvement over either the price-to-earnings ratio (P/E
7 ratio) or dividend/price (D/P) methods. Comparing the P/E ratios and the dividend yield
8 (D/P) are helpful as a rule of thumb, but they must be used with caution because, among
9 other reasons, two companies with the same dividend yield can have a different COE if
10 they have different retention rates. A DCF model is more reliable than these rules of thumb
11 because it can account for different retention rates, among other factors.

12 **Valuation of Retained Earnings vs. Dividends:** There is a difference to investors
13 in the value of earnings paid out as a dividend compared to the value of earnings retained
14 in the business because the return on earnings retained in the business depends upon the
15 opportunities available to that company. If a regulated utility reinvests earnings in needed
16 “used and useful” utility assets, then those reinvested earnings have the potential to earn at
17 whatever rate of return is consistent with ratemaking procedures allowed and the skill of
18 management in prudently operating the system.

19 When an investor receives a dividend, he can either reinvest it in the same or
20 another company or use it for other things, such as paying down debt or paying living
21 expenses. Although an investor could theoretically use the proceeds from any dividend
22 payments to simply buy more stock in the same company, when an investor increases his
23 investment in a company by purchasing more stock, the transaction occurs at market price.

1 However, when the same investor sees his investment in a company increase because
2 earnings are retained rather than paid as a dividend, the reinvestment occurs at book value.
3 Stated within the context of the DCF terminology: earnings retained in the business earn at
4 the future expected return on book equity “r,” and dividends used to purchase new stock
5 earn at the rate “k.” When the market price exceeds book value (that is, the market-to-
6 book ratio exceeds 1.0), retained earnings are worth more than earnings paid out as a
7 dividend because “r” will be higher than “k.” Conversely, when the market price is below
8 book value, “k” will be higher than “r,” meaning that earnings paid out as a dividend earn
9 a higher rate than retained earnings.

10 Even if retained earnings are more valuable when the market-to-book ratio is above
11 1.0, a company might still choose to pay a dividend. Retained earnings are more valuable
12 than dividends only if there are sufficient opportunities to profitably reinvest those
13 earnings. Regulated utility companies are allowed to earn the cost of capital only on assets
14 that are used and useful in providing utility service. Investing in assets that are not needed
15 may not produce any return at all. For unregulated companies, opportunities to reinvest
16 funds are limited by the demands of the business. For example, how many new computer
17 chips can Intel profitably develop at the same time?

18 **Flexibility of the Non-Constant DCF Model:** Under the non-constant DCF
19 model, it is not necessary for earnings and dividends to grow at a constant rate for the
20 model to be able to accurately determine the cost of equity. Because the non-constant form
21 of the DCF model separately discounts each and every future expected cash flow, it does
22 *not* rely on any assumptions of constant growth. The dividend yield can be different from
23 period to period, and growth can bounce around in any imaginable pattern without harming

1 the accuracy of the answer obtained from quantifying those expectations. When the non-
2 constant DCF model is correctly used, the answer obtained is as accurate as the estimates
3 of future cash flow.
4

APPENDIX E. CAPITAL ASSET PRICING MODEL

1 **Risk Free Rate:** When looking for a security to calculate an estimate of the risk-
2 free rate, it could be argued that it is appropriate to find one with a term or maturity that
3 best matches the life of the asset being financed. In that sense, the 30-year Treasury bond
4 yield can be argued to be ideal for this specific application. However, it is equally
5 important to find a security that has a beta coefficient with the overall market as close to
6 zero as possible, because by the very definition of the risk-free rate in the CAPM model,
7 its movements should have no correlation to the movements of the market. And this is
8 where the problem with the 30-year Treasury bond yield arises, as it has an established
9 non-zero beta. The 3-month Treasury bill yield has a considerably lower beta, and
10 therefore is superior in that respect to the 30-year Treasury bond yield. Neither one is a
11 perfect fit on both fronts, which is why I have chosen to consider both as proxies for the
12 risk-free rate to establish a range for my CAPM results.

13 It is important to recognize that current long-term Treasury bond yields represent a
14 direct observation of investor expectations and there is no need to use “expert” forecasts
15 such as Blue Chip to determine the appropriate risk-free rate to use in a CAPM analysis or
16 any other cost of equity calculations.

17 Many economists and forecasters will continue to be quoted in the press
18 prognosticating on possible developments that are truly unpredictable. The Nobel Laureate
19 Economist Daniel Kahneman stated the following regarding forecasting:

1 It is wise to take admissions of uncertainty seriously, but declarations of
2 high confidence mainly tell you that an individual has constructed a
3 coherent story in his mind, not necessarily that the story is true.¹⁰⁶

4 **Historical Beta:** I calculate historical betas following the methodology used by
5 Value Line, with some modifications. Specifically, Value Line adheres to the following
6 guidelines:

- 7 1. Returns for each security are regressed against returns for the overall market
8 in the following form:

$$\ln(p^I_t / p^I_{t-1}) = a_I + B_I * \ln(p^m_t / p^m_{t-1})$$

9
10 Where:

- 11 • p^I_t is the price of the security I at time t
- 12 • p^I_{t-1} is the price of the security I one week before time t
- 13 • p^m_t and p^m_{t-1} are the corresponding values of the market index
- 14 • B_I is the regression estimate of Beta for the security against the
15 market index

- 16 2. The natural log of the price ratio is used as an approximation of each return
17 and no adjustment is made for dividends paid during the week.
- 18 3. Weekly returns are calculated on one day of the week, with a stated
19 preference for Tuesdays to minimize the effect of holidays as much as
20 possible.

¹⁰⁶ DANIEL KAHNEMAN, *Thinking Fast and Slow*, p. 212(New York: Farrar, Straus, and Giroux, 2011).

4. Betas calculated using the regression method above are adjusted as per Blume (1971).¹⁰⁷ using the following formula:¹⁰⁸

$$\text{Adjusted } B_I = 0.35 + 0.67 * \text{Calculated } B_I$$

There are four differences between my historical beta calculations and Value Line's calculations:

1. The first significant difference is that whereas Value Line uses the New York Stock Exchange Composite Index as the market index, I use the S&P 500 Index.
2. Another important difference is that whereas Value Line calculates weekly returns on one day of the week, with a stated preference for Tuesdays, I calculate weekly returns on all days of the week.
3. Value Line only calculates betas every 3 months in their quarterly company reports, whereas I use the same consistent methodology to calculate betas every week during the most recent 3 complete months (February through April 2026).
4. Value Line always uses a 5-year period for the return regression,¹⁰⁹ whereas I calculate historical betas for periods of 6 months, 2 years, and 5 years.

¹⁰⁷ M. Blume, On the Assessment of Risk, *The Journal of Finance*, Vol. XXVI (March 1971) at www.stat.ucla.edu/~nchristo/Fiatlux/blume2.pdf.

¹⁰⁸ Michelfelder and Theodossiou (2013) have discredited the Blume adjustment for regulated public utility stocks, but Gombola and Kahl (1990) found that, while their betas do not approach unity, they are nonstationary. My use of the Blume adjustment, then, is “conservative”, from the perspective of the EOE.

Michelfelder, R.A. & Theodossiou, P. (2013). Public utility beta adjustment and biased costs of capital in public utility rate proceedings, *Electricity Journal* 26(9), 60-68. <https://doi.org/10.1016/j.tej.2013.09.017>

Gombola, M. & Kahl, D. (1990). Time-series processes for utility betas: implications for forecasting systematic risk, *Financial Management* 19(3), 84-93. <https://www.jstor.org/stable/3665827>

¹⁰⁹ They offer betas calculated over different time periods on their website, including 3 years and 10 years.

1 In the following pages, I explain my rationale for making the four modifications
2 above to Value Line's beta calculation methodology.

3 **Choice of Market Index (S&P 500 vs. NYSE):** A critical factor in the calculation
4 of a beta coefficient is the choice of index to represent the overall market. Using exactly
5 the same beta calculation methodology with a different market index will result in different
6 values of beta for a given company or portfolio — sometimes drastically different values.
7 It is easy to jump to the conclusion that this points to a flaw in CAPM theory, as different
8 values of beta would result in a different implied cost of equity. However, another key
9 component of the CAPM, the market risk premium, also depends on the choice of the
10 market index, which in theory would have an offsetting effect on the cost of equity
11 calculation. This points to the most important aspect of selecting a market index for a
12 CAPM analysis, which is to be consistent and use the same index for the calculation of
13 beta as for the calculation of the market risk premium. This is a fundamental concept of
14 the CAPM, and using betas based on one index with a market risk premium based on a
15 different index yields invalid results.

16 As stated above, Value Line calculates its published betas based on the NYSE
17 Composite Index. Most methodologies used to calculate the market risk premium,
18 including those I rely on, are based on the S&P 500 Index, so using them in the CAPM
19 together with Value Line betas exactly as published would yield invalid results.

20 For this reason, I calculate my historical betas versus the S&P 500 Index, making
21 my CAPM approach entirely consistent.

22 As an aside related to my option-implied betas, using the S&P 500 Index
23 consistently throughout my CAPM has the added benefit that this index has a much larger

1 number of options traded, which makes the calculation of option-implied betas more
2 reliable.

3 **Daily vs. Single-Day Weekly Return Calculations:** Using one day of the week to
4 calculate weekly returns for use in the regression analysis used to calculate historical betas
5 has the unintended effect of generating different values of betas depending on the day of
6 the week that is used. To clarify, if one were to use Value Line's precise methodology for
7 calculating a 5-year historical beta for a given company using weekly returns calculated on
8 Tuesdays, the resulting beta value would be different than the resulting value if one were
9 to use the same exact methodology, but using weekly returns calculated on Wednesdays,
10 or any other day of the week. Even though 5-year historical betas should in theory be quite
11 stable and should not change very much from one day to the next, calculating returns on
12 only one day of the week results in differences that can be significant and make no sense
13 conceptually.

14 It is easy to understand why it happens. Even though there is some correlation due
15 to some overlap, the set of weekly returns calculated on Mondays is a completely different
16 set of numbers than the set of weekly returns calculated on Tuesdays. As a result, there
17 are five 5-year betas that can result from Value Line's methodology, and even though the
18 Monday beta for a given company will change slowly from week to week, the change
19 between the Monday beta and the Tuesday beta, calculated just one trading day apart, can
20 be quite significant.

21 Since I became aware of this undesirable effect, I began calculating my historical
22 betas based on an all-encompassing set of weekly returns calculated on every trading day
23 in the beta calculation period. This methodology has the effect of averaging out the five

1 possible betas that could result from using only one day of the week for the return
2 calculations,¹¹⁰ as Value Line does. In this way, a 5-year beta calculated on any two
3 consecutive trading days would only change minimally, as it should.

4 Using a daily calculation of weekly returns could be criticized for the resulting
5 overlap in a weekly return from Monday to Monday with that from Tuesday to Tuesday.
6 However, given that the overlap is consistent and equal for the net effect of every trading
7 day, no trading day is given undue weight in the regression. Even though the effect of each
8 trading day appears 5 times in the weekly return data, there are also 5 times the total number
9 of weekly returns in the overall set used in the regression, so any individual trading day
10 has the same relative weight than in Value Line's methodology. The fact that the resulting
11 beta value of this aggregate approach turns out to be a sort of average of the five possible
12 values that would result from Value Line's methodology on different days of the week is
13 the final confirmation that this is the superior approach for calculating a historical beta
14 based on weekly returns.

15 Using a daily calculation of weekly returns has the added benefit of providing more
16 data pairs to be used in historical beta calculations for shorter periods, such as for 6-month
17 historical betas, where instead of 25 return pairs, the regression is performed on 117 return
18 pairs.

19 **Benefits of Independent Calculations & Statistical Significance:** Doing my own
20 historical beta calculations using Value Line's established methodology allows me to see
21 how beta values change from week to week and to use the most up-to-date beta calculations

¹¹⁰ The resulting beta is not a direct arithmetic or geometric average of the other five betas, but rather a regression based on the union of all five possible sets of weekly returns.

1 instead of relying on stale beta values that can be more than 3 months old, inappropriate
2 for the up-to-date snapshot of the market that I am taking.

3 Regarding the number of data point pairs necessary to estimate the relationship
4 between two variables in a regression analysis, establishing a minimum number is
5 somewhat subjective, though various authorities on statistics argue the number is between
6 3 and 8 data pairs. While one can broadly correctly generalize that the more data point
7 pairs one uses, the more certain one can be about the significance of the results of any
8 correlation analysis, this is very different from stating that one cannot achieve statistical
9 significance with a relatively low number of data pairs. In fact, it is important to realize
10 that one can achieve statistical significance with fewer than 10 data pairs, and that even
11 hundreds of data pairs do not guarantee statistical significance. For precisely this reason,
12 statisticians have developed a tool that helps determine statistical significance based on the
13 number of data pairs in a regression analysis.

14 A “table of critical values” of Pearson’s correlation, which can be readily found
15 online¹¹¹ or in most statistics books, tells a statistician that for 25 data point pairs (implying
16 $N-2=23$ “degrees of freedom”), a correlation, or beta, coefficient of 0.505 or higher will
17 occur *by chance* with a probability of only 0.01..¹¹² As explained in more detail in the text
18 regarding how to use the table of critical values,¹¹³ any beta coefficient above this level,
19 and certainly above the 0.351 3-month average for the recent 6-month betas for my Nowak
20 Proxy Group, by definition are considered statistically significant. The threshold for

¹¹¹ University of Connecticut, *r Critical Value Table*, available at:
https://researchbasics.education.uconn.edu/r_critical_value_table/#

¹¹² In fact, many researchers use a more lenient “alpha level” of 0.05 for determinations of statistical significance.

¹¹³ University of Connecticut, *Statistical Significance: Is there a relationship (difference) or isn't there a relationship (difference)?* at https://researchbasics.education.uconn.edu/statistical_significance

1 statistical significance for 117 data point pairs (implying 115 “degrees of freedom”), is so
2 low that it is not even included in the table of critical values. The maximum “degrees of
3 freedom” listed is 100, with an already very low threshold of 0.254.

4 **Historical Blended Beta:** I am not aware of any academic study specifically
5 focused on the optimal relative weight of historical betas to predict future betas. However,
6 the authors of the paper I relied upon for guidance on the calculation of my option-implied
7 betas did attempt to quantify the predictive power of 6-month option-implied (“forward-
8 looking”) betas as well as that of 6-month (“180-day”), 1-year, and 5-year historical betas
9 by back-testing historical predictions with actual *expost* results, or “realized” betas, for the
10 30 companies in the Dow Jones Index. In addition to using each of the betas above
11 independently, they also measured the predictive power of a “mixed” beta consisting of a
12 simple average of the six-month option-implied beta and the 6-month historical beta.

13 Their conclusions for predicting 6-month future betas are as follows:

14 The forward-looking beta outperforms the other methods ten times, and the
15 same is true for the 180-day historical beta. The mixed beta is the best
16 performer in seven cases, and the 1-year historical beta in three cases. The
17 5-year historical beta is always outperformed by at least one other method,
18 and it often ranks last. The 180-day historical beta clearly dominates the
19 two other historical methods.¹¹⁴

20 Their conclusions for predicting 1-year and 2-year future betas are as follows:

21 Somewhat unexpectedly, the performance of the forward-looking beta
22 compared to that of the 180-day historical beta is much better [for the one-
23 year prediction] than [for the six-month prediction], and this conclusion
24 carries over to [the two-year prediction]. The mixed beta also perform [sic]
25 well. It is perhaps not surprising that the performance of the 180-day
26 historical beta [for the one- and two-year predictions] is poorer than [for the
27 six-month prediction], because the horizons used in the construction of
28 realized betas are no longer equal to 180 days. What is harder to explain is

¹¹⁴ Peter Christoffersen, Kris Jacobs, & Gregory Vainberg, *Forward-Looking Betas*, p. 16 (April 25, 2008) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=891467.

1 why the correlation between realized beta and forward-looking beta is in
2 many cases higher [for the one- and two-year predictions] than [for the six-
3 month prediction]. Finally, it is also interesting that the 1-year and 5-year
4 historical betas do not perform well [for the one-and two-year predictions].
5 In summary, [for the one-year prediction] either the forward-looking beta
6 or the mixed beta is the best performer in nineteen out of thirty cases. [For
7 the two-year prediction], this the case twenty-two times out of thirty.¹¹⁵

8 Their conclusions strongly support the use of 6-month historical betas, 6-month
9 option-implied betas, and/or an average of the two as predictors of future betas 6 months,
10 1 year, or 2 years into the future. Therefore, considering a historical blended beta in
11 conjunction with option-implied betas to calculate the cost of equity is consistent with
12 research findings that combining historical and option-implied betas is the best predictor
13 of future betas.

14 I decided on the composition of my historical blended betas primarily based on the
15 conclusions of the authors above. Though the predictive power of longer-term historical
16 betas seems to be quite reduced, it is not zero, so in an effort to preserve the effect of longer-
17 term market trends in my historical blended betas, I chose to incorporate 5-year historical
18 betas.

19 **Market Risk Premium:** I used a cumulative probability of 50.0% in the calculation
20 of my option-implied growth for the S&P 500, which results in a value of 7.82% as of
21 February 28, 2026 and a value of 7.65% for the weighted average of the 3 months ending
22 on that date. As stated above, a cumulative probability of 50% represents the median of
23 the probability distribution, or in this case the option-implied market consensus, which is
24 why I have chosen to use this level.

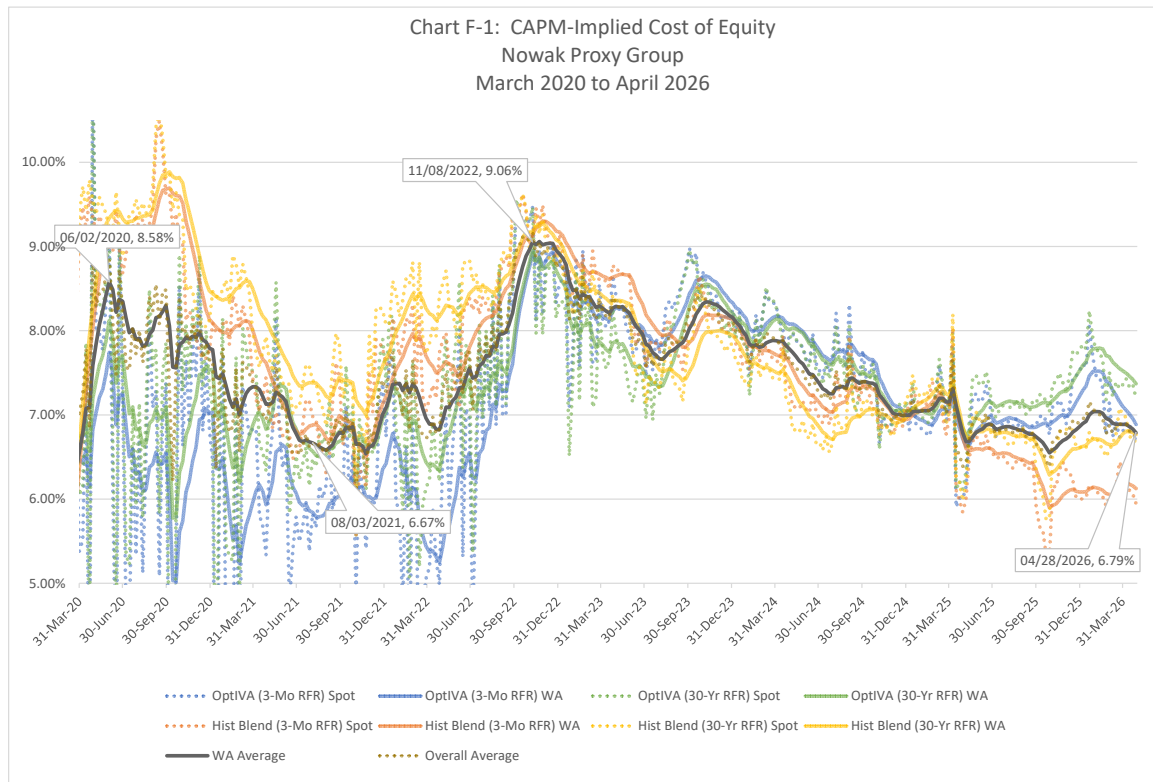
¹¹⁵ *Id. at 17.*

1 The cumulative probabilities referred to in this case are directly comparable to the
2 cumulative probabilities I have used or referred to in his prior filed testimonies. In late
3 2020, after significant efforts related to the complexities in processing extremely large
4 volumes of option data, I was finally able to use option-implied volatility and option-
5 implied skewness to come up with a log-normal distribution that approximates the
6 probability distribution of the possible trajectories for the S&P 500 implied by the options
7 market as of any given day, as explained above. All of the testimonies I have filed since
8 then, starting in 2021, have used this complete and superior approach along with a
9 cumulative probability of 50%, representing the median of the probability distribution, or
10 the option-implied market consensus, to estimate expected market growth. Any references
11 to cumulative probability in these testimonies are directly comparable.

12 Prior to incorporating skewness into the approximation, I used a normal function to
13 estimate the same probability distribution referred to above. Using a normal distribution as
14 an approximation is a simplification used commonly in economics, including in the Black-
15 Scholes formula for a single option. However, unlike a skewed log-normal distribution, a
16 normal distribution has the same median and mean, meaning that when applied in this case,
17 the option-implied market consensus of this simplified approximation implies market
18 growth of 0%. As a result, before using log-normal distributions, I had to resort to finding
19 an adequate level of cumulative probability above 50% to estimate market growth, which
20 is admittedly somewhat subjective. To be conservative, I often used a cumulative
21 probability of 68.3%, which is the probability found within one standard deviation of the
22 mean of a normal distribution, which I understood would lead to a conservatively high
23 estimate for market growth.

1 It is important to point out that the cumulative probabilities of the simplified normal
2 distribution approximation I used in cases before 2021 cannot be directly compared to the
3 cumulative probabilities of the superior log-normal distribution approximation, which
4 takes skewness into account. The considerably improved approximation based on a log-
5 normal distribution eliminates all subjectivity in arriving at the implied market consensus
6 and allows a much better measure of implied cumulative probabilities of deviations from
7 that market consensus.

APPENDIX F. CAPM-IMPLIED COST OF EQUITY FOR NOWAK PROXY GROUP OVER TIME SINCE ONSET OF COVID PANDEMIC



1

Notes regarding the content of this chart:

- The information in this chart is the property of Rothschild Financial Consulting (“RFC”) and may not be used for any purpose without the express written consent of RFC. Even when the underlying data are publicly available from another source, the results of analyses performed by RFC and the way of presenting the data are and remain the property of RFC.
- The data presented herein may not agree 100% with past recommendations by RFC for numerous reasons, including differences in the underlying proxy group and the fact that this chart represents only results based on the CAPM, whereas RFC usually bases recommendations on the CAPM and other models, such as various forms of the DCF.

APPENDIX G. OPTION-IMPLIED GROWTH METHODOLOGY

1 **The "Inverse Problem" Approach:** My methodology solves what economists call
2 the "inverse problem." To understand this, it is helpful to contrast it with the traditional
3 textbook approach:

- 4 • **The Old Way (Theoretical Models):** Historically, academics used models
5 like Black-Scholes to predict what a stock option's price should be, based
6 on their own assumptions about the future growth of the underlying stock.
- 7 • **The Modern Way (Market-Implied):** The "inverse problem" approach
8 simply reverses this logic. Instead of guessing what the price should be, I
9 look at what the price actually is in the liquid market and use it to infer the
10 growth investors expect.

11 Because I know the market price is the most reliable data point available, I can
12 work backward to mathematically determine the growth expectations that justify that price.

13 **Extracting Expectations from Stock Options:** It is a fundamental economic
14 reality that the price investors are willing to pay for an option today is directly determined
15 by their expectations of the stock's future value. My analysis extracts this information by
16 observing the prices of options across a wide range of different target prices (strike prices).
17 Using a standard mathematical framework originating with the Breeden-Litzenberger
18 theorem, I measure how option prices change from one strike price to the next to reveal the
19 exact probability distribution the market assigns to the stock's future trajectory.

20 This is not a novel or experimental method. It is the foundation of the exact same
21 mathematical framework utilized by the Federal Reserve Bank of Minneapolis to estimate

1 market probabilities, and by the Chicago Board Options Exchange (CBOE) to calculate
2 global benchmarks like the VIX and SKEW indices.

3 **Amount of Stock Option Data:** As discussed earlier, the trading activity in the
4 stock options market is enormous. My analysis is based on an extremely large set of market
5 data, making it highly robust. To avoid short-lived changes in the market, my analysis
6 relies on data gathered weekly over the course of the last quarter, on 13 sequential Tuesdays
7 between December 2025 and February 2026.

8 The depth of this data is substantial:

- 9 • **Strike Prices:** On any given date, the option contracts analyzed cover
10 between 4,277 and 5,197 different strike prices for calls and the same
11 number for puts.
- 12 • **Open Interest (Pre-Filtering):** Since each options contract represents 100
13 units of the underlying index, the total Open Interest covered between 526
14 and 775 million share equivalents for calls and between 805 and 1,266
15 million (1.3 billion) share equivalents for puts.
- 16 • **Open Interest (Post-Filtering):** Even after applying strict filtering criteria
17 to remove illiquid quotes, the dataset remains massive. The average number
18 of share equivalents covered by the remaining puts and calls across the 13
19 dates is 1,051 million (over 1 billion shares).

20 **Steps I Took To Calculate This Option-Implied Growth:** Calculating the option-
21 implied growth of the S&P 500 requires five specific steps:

- 22 1. Obtain stock option data for the S&P 500 index.
- 23 2. Filter the stock option data to remove noise.

- 1 3. Calculate the option-implied volatility for the index.
- 2 4. Calculate the option-implied skewness for the index.
- 3 5. Calculate the option-implied growth based on the probability distribution
- 4 implied by that volatility and skewness.

5 There are various ways one could choose to perform these steps, but I chose to filter
6 stock option data and calculate option-implied volatility and skewness following exactly
7 the same methodology used by the CBOE in the calculation of their widely-used VIX Index
8 (Volatility Index) [3] and SKEW Index [4], respectively.

9 **Data Filtering (Steps 1 & 2)** I started with publicly available trading information
10 for all options on the S&P 500 index for the relevant trading days. I then filtered the option
11 data as described by the CBOE using the following strict guidelines:

- 12 1. **Use the mid-quote:** I used the average of the bid and ask prices.
- 13 2. **Select the right options:** I used only out-of-the-money call and put options.
 - 14 ○ I determined the “moneyness” threshold where the absolute
 - 15 difference between call and put prices is smallest (using the CBOE
 - 16 “Forward Index Price” formula).
 - 17 ○ For the "at-the-money" strike, I used the average of the call and put
 - 18 prices.
- 19 3. **Remove dead quotes:** I excluded all zero bids.
- 20 4. **Clean tails:** I excluded remaining (far out-of-the-money) options once two
- 21 sequential zero bids were found.

22 This process 'cleans' the raw data by removing inactive or illiquid options, ensuring
23 that the final calculation relies only on valid, high-quality market signals.

24 **Volatility and Skewness Calculations (Steps 3 & 4):** I applied the formulas
25 described in the CBOE’s white papers to the filtered options.

- **Option-Implied Volatility** reflects investors' expectations regarding the magnitude of future stock price movements (risk).
- **Option-Implied Skewness** reflects investors' expectations regarding the shape of that risk—specifically, the fear of a sudden market crash (tail risk).

Converting Volatility and Skewness Into The Final Growth Rate (Step 5): In

this final step, I use established mathematical formulas to approximate a log-normal probability distribution that matches the volatility and skewness implied by the options market. This probability distribution can then be used to calculate the growth investors expect with any desired level of cumulative probability. The median, or 50% cumulative probability level, represents the market consensus of expected growth, and this is the level I use as the Option-Implied Growth Rate in my DCF analysis.

This is the critical final step. Financial theory dictates that investors require a higher return (a "risk premium") for assets that are volatile or prone to sudden crashes. Essentially, the formula converts the "fear" measured by the VIX and SKEW calculations into the specific "return" investors are demanding to compensate them for that fear. This results in the Option-Implied Growth Rate I used in my DCF analysis.

APPENDIX H. RESUME OF AARON L. ROTHSCCHILD

SUMMARY

Financial professional providing U.S. public utility commissions financial tools and expert testimony to assist in rate setting for regulated utility companies (e.g., regulated electric distribution providers, natural gas pipelines). Relevant experience includes developing and applying methodologies that directly measure investors' equity return expectations based on stock option prices, applied mathematics research for utility industry as an affiliate of the New England Complex Systems Institute, and serving as Head of Business Analysis for a major U.S. telecom firm in Asia Pacific.

EXPERIENCE

Rothschild Financial Consulting, Ridgefield, CT

November 2001- present

Independent consulting firm specializing in utility sector

President

- Provide financial expert testimony (e.g., rate of return and M&A) to regulators, policy makers, foundations, and consumer groups in utility rate case proceedings
- Developed cost of equity models that have been used by public utility commissions for rate setting purposes in many states around the country
- Present at utility regulation conferences (NARUC/NASUCA, MARC and SURFA) regarding rate of return, power purchase agreements, complex systems science, subsidy auctions, and cost of equity methodologies

360 Networks, Hong Kong

January 2001 - October 2001

Pioneer of the fiber optic telecommunications industry

Senior Manager

- Business development and investment evaluation
- Negotiated landing rights and formed local partnerships in Korea, Japan, Singapore, and Hong Kong for \$1 billion undersea cable project
- Structured fiber optic bandwidth swapping agreement with Enron and Global Crossing
- Established relationships with Hong Kong based Investment Bankers to communicate Asia Pacific objectives and accomplishments to Wall Street

Dantis, Chicago, IL

July 2000- December 2000

Start-up managed data-hosting services provider

Director

- Built capital raise valuation models and negotiated with potential investors
- Team raised \$100M from venture capital firm through valuation negotiations and internal strategic analysis

MFS, MCI-WorldCom, Chicago, Hong Kong, Tokyo

September 1996- July 2000

American Telecommunications Company

Head of Business Analysis for Japan operations

- Managed staff of 5 business development analysts
- Raised \$80M internally for Japanese national fiber network expansion plan by conducting an investment evaluation and presenting findings to CEO of international operations in London, UK
- Built financial model for local fiber optic investment evaluation that was used by business development offices in Oak Brook, IL and Sydney, Australia

EDUCATION

Vanderbilt University, Nashville, TN**1994-1996*****MBA, Finance***

- Completed business plan for Nextlink Communications in support of their national fiber optic network expansion, including identifying opportunities from passage of Telecom Act of 1996
- Developed analytical framework to evaluate predictability of rare events
- Provided financial and accounting analysis to Chicago's consumer advocate, the Citizens Utility Board (CUB) as a summer intern

Clark University, Worcester, MA**1990 - 1994*****BA, Mathematics***

APPENDIX I. TESTIFYING EXPERIENCE OF AARON L. ROTHSCCHILD

Filed Rate of Return Testimonies:

California

- Pacific Gas and Electric Company, Application 25-03-010, Rate of Return, July 2025
- Southern California Edison, Application 25-03-011, Rate of Return, July 2025
- San Diego Gas & Electric Company, Application 25-03-012, Rate of Return, July 2025
- Southern California Gas Company Application 25-03-013, Rate of Return, July 2025
- Pacific Gas and Electric, Application 22-04-008 et al, Rate of Return/Cost of Capital Mechanism, January 2024
- Liberty Utilities, Application A.23-05-004, Rate of Return, August 2023
- San Gabriel Water Company, Application 23-05-001, Rate of Return, August 2023
- Suburban Water Company, Application 23-05-003, Rate of Return, August 2023
- Great Oaks Water Company, Application 23-05-002, Rate of Return, August 2023
- Incumbent Local Exchange Carriers (ILECs), Application 22-09-003, Rate of Return, May 2023
- Pacific Gas and Electric Company, Application 22-04-008, Rate of Return, August 2022
- Southern California Edison, Application 22-04-009, Rate of Return, August 2022
- San Diego Gas & Electric Company, Application 22-04-012, Rate of Return, August 2022
- California American Water Company, Application 21-05-001, Rate of Return, January 2022
- California Water Service Company, Application 21-05-002, Rate of Return, January 2022
- Golden State Water Company, Application 21-05-003, Rate of Return, January 2022
- San Jose Water Company, Application 21-05-004, Rate of Return, January 2022
- Southern California Edison, Application 21-08-013, Rate of Return/Cost of Capital Mechanism, January 2022
- San Diego Gas & Electric Company, Application 21-08-014, Rate of Return/Cost of Capital Mechanism, January 2022
- Pacific Gas and Electric Company, Application 21-08-015, Rate of Return/Cost of Capital Mechanism, January 2022
- Pacific Gas and Electric Company, Application 21-01-004, Securitization, February 2021
- Pacific Gas and Electric Company, Application 20-04-023, Securitization, October 2020
- Southern California Edison, Application 20-07-008, Securitization, September 2020
- San Diego Gas & Electric Company, Application 19-04-017, Rate of Return, August 2019
- Southern California Gas Company, Application 19-04-016, Rate of Return, August 2019
- Pacific Gas and Electric Company, Application 19-04-015, Rate of Return, August 2019
- Southern California Edison, Application 19-04-014, Rate of Return, August 2019
- Liberty Utilities, Application A.18-05-006, Rate of Return, August 2018
- San Gabriel Water Company, Application 18-05-005, Rate of Return, August 2018
- Suburban Water Company, Application 18-05-004, Rate of Return, August 2018
- Great Oaks Water Company, Application 18-05-001, Rate of Return, August 2018
- California Water Service Company, Application 17-04-006, Rate of Return, August 2017
- California American Water Company, Application 17-04-003, Rate of Return, August 2017
- Golden State Water Company, Application 17-04-002, Rate of Return, August 2017
- San Jose Water Company, Application 17-04-001, Rate of Return, August 2017

Colorado

- Public Service Company of Colorado, Docket No. 11AL-947E, Rate of Return, March 2012

Connecticut

- Yankee Gas Service Company, Docket No. 24-14-01, Rate of Return, March 2025
- United Illuminating Company, Docket No. 24-10-04, Rate of Return, February 2025
- Connecticut Natural Gas Corporation, Docket No. 23-11-02, Rate of Return, February 2024
- The Southern Connecticut Gas Company, Docket No. 23-11-02, Rate of Return, February 2024
- The Connecticut Water Company, Docket No. 23-08-32, Rate of Return, December 2023
- United Illuminating Company, Docket No. 22-08-08, Rate of Return, December 2022
- Aquarion Water Company of Connecticut, Docket No. 22-07-01, Rate of Return, October 2022
- Eversource and United Illuminating, Docket No. 17-12-03RE11, Rate of Return / Interim Rate Reduction, April 2021
- United Water Connecticut, Docket No. 07-05-44, Rate of Return, November 2008
- Valley Water Systems, Docket No. 06-10-07, Rate of Return, May 2007

Delaware

- Tidewater Utilities, Inc., PSC Docket No. 11-397, Rate of Return, April 2012

District of Columbia

- Washington Gas Light Company, Formal Case No. 1180, Rate of Return, January 2025
- Washington Gas Light Company, Formal Case No. 1169, Rate of Return, May 2023

Florida

- Florida Power & Light (FPL), Docket No. 070001-EI, October 2007
- Florida Power Corp., Docket No. 060001 Fuel Clause, September 2007

Maryland

- Delmarva Power & Light, Case No. 9317, Rate of Return, June 2013
- Columbia Gas of Maryland, Case No. 9316, Rate of Return, May 2013
- Potomac Electric Power Company, Case No. 9286, Rate of Return, March 2012
- Delmarva Power & Light, Case No. 9285, Rate of Return, March 2012

New Jersey

- Aqua New Jersey, Inc., BPU Docket No. WR11120859, Rate of Return, April 2012

New York

- Consolidated Edison Company of New York, Inc., Docket No. 2025-S-0741, March 2026

New Hampshire

- Public Service Company Of New Hampshire., Docket No. DG 24-07,0 Rate of Return, January 2025
- Liberty Utilities (Energy North Natural Gas) Corp., Docket No. DG 23-067, Rate of Return, February 2024
- Liberty Utilities (Granite State Electric) Corp., Docket No. DE 23-039, Rate of Return, December 2023

North Dakota

- Montana-Dakota Utilities Co., Case No. PU-20-379, Rate of Return, January 2021
- Otter Tail Power Company, Case No. PU-17-398, Rate of Return, May 2018
- Montana-Dakota Utilities Co., Case No. PU-15-90, Rate of Return, August 2015
- Northern States Power, Case No. PU-400-04-578, Rate of Return, March 2005

Pennsylvania

- Aqua Pennsylvania, Inc., Docket No. R-2024-3047822, Rate of Return, August 2024

- Peoples Natural Gas Company LLC, Docket No. R-2023-304459, Rate of Return, March 2024
- UGI Utilities, Inc. – Electric Division, Docket No. R-2022-3037368, Rate of Return, April 2023
- Pennsylvania American Water Company, Docket No. R-2022-3031672 and R-2022-3031673, Rate of Return, July 2022
- UGI Utilities, Inc. – Electric Division, Docket No. R-2021-3023618, Rate of Return, May 2021
- Pennsylvania American Water Company, Docket No. P-2021-3022426, Rate of Return, February 2021
- Audubon Water Company, Docket No. R-2020-3020919, Rate of Return, November 2020
- Pennsylvania American Water Company, Docket No. R-2020-3019369 and R-2020-3019371, Rate of Return, September 2020
- Twin Lakes Utilities, Inc., Docket No. R-2019-3010958, Rate of Return, October 2019
- City of Lancaster Sewer Fund, Docket No. R-2019-3010955, Rate of Return, October 2019
- Community Utilities of Pennsylvania Inc. Wastewater Division, Docket No. R-2019-3008948, Rate of Return, July 2019
- Community Utilities of Pennsylvania Inc. Water Division, Docket No. R-2019-3008947, Rate of Return, July 2019
- Newtown Artesian Water Company, Docket No. R-20019-3006904, Rate of Return, May 2019
- Hidden Valley Utility Services, L.P. – Wastewater Division, Docket No. R-2018-3001307, Rate of Return, September 2018
- Hidden Valley Utility Services, L.P. – Water Division, Docket No. R-2018-3001306, Rate of Return, September 2018
- The York Water Company, Docket No. R-2018-3000019, Rate of Return, August 2018
- SUEZ PA Pennsylvania, Inc., Docket No. R-2018-000834, Rate of Return, July 2018
- UGI Utilities, Inc. – Electric Division, Docket No. R-2017-2640058, Rate of Return, April 2018
- Wellsboro Electric Company, Docket No. R-2016-2531551, Rate of Return, December 2016
- Citizens’ Electric Company of Lewisburg, PA, Docket No. R-2016-2531550, Rate of Return, December 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2016-2529660, Rate of Return, June 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2015-2468056, Rate of Return, June 2015
- Pike County Light & Power Company, Docket No. R-2013-2397353 (gas), Rate of Return, April 2014
- Pike County Light & Power Company, Docket No. R-2013-2397237 (electric), Rate of Return, April 2014
- Columbia Water Company, Docket No. R-2013-2360798, Rate of Return, August 2013
- Peoples TWP LLC, Docket No. R-2013-2355886, Rate of Return, July 2013
- City of Dubois – Bureau of Water, Docket No. R-2013-2350509, Rate of Return, July 2013
- City of Lancaster – Sewer Fund, Docket No. R-2012-2310366, Rate of Return, December 2012
- Wellsboro Electric Company, Docket No. R-2010-2172665, Rate of Return, September 2010
- Citizens’ Electric Company of Lewisburg, PA, Docket No. R-2010-2172662, Rate of Return, September 2010
- T.W. Phillips Gas and Oil Company, Docket No. R-2010-2167797, Rate of Return, August 2010
- York Water Company, Docket No. R-2010-2157140, Rate of Return, August 2010
- Joint Application of The Peoples Natural Gas Company, Dominion Resources, Inc. and Peoples Hope Gas Company LLC, Docket No. A-2008-2063737, Financial Analysis, December 2008
- York Water Company, Docket No. R-2008-2023067, Rate of Return, August 2008

Rhode Island

- 1 – Rhode Island Energy, Docket No. 25-45-GE, Rate of Return, April 2026

South Carolina

- Dominion Energy South Carolina, Inc., Docket No. 2025-325-E, Rate of Return, March 2026

- Kiawah Island Utility, Inc., Docket No., Rate of Return, 2025-243-WS, December 2025
- Duke Energy Carolinas, LLC., Docket No. 2025-172-E, Rate of Return, October 2025
- Duke Energy Progress, LLC., Docket No. 2025-154-E, Rate of Return, September 2025
- Duke Energy Carolinas, LLC., Docket No. 2025-65-E, Securitization, May 2025
- Dominion Energy South Carolina, Inc., Docket No. 2024-34-E, Rate of Return, June 2024
- Duke Energy Carolinas, LLC., Docket No. 2023-388-E, Rate of Return, April 2024
- Duke Energy Progress, LLC., Docket No. 2023-89-E, Securitization, September 2023
- Dominion Energy South Carolina, Inc., Docket No. 2023-170-G, Rate of Return, July 2023
- Duke Energy Progress, LLC., Docket No. 2022-254-E, Rate of Return, December 2022
- Daufuskie Island Utility Company, Inc., Docket No. 22-142-WS, Rate of Return, September 2022
- Piedmont Natural Gas Company, Inc., Docket No. 22-89-G, Rate of Return, July 2022
- Kiawah Island Utility, Inc., Docket No. 2021-324-WS, Rate of Return, February 2022
- Palmetto Wastewater Reclamation, Inc., Docket No. 2021-153-S, Rate of Return, September 2021
- Dominion Energy South Carolina, Inc., Docket No. 2020-125-E, Rate of Return, November 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Rate of Return, May 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Accounting, May 2020
- Blue Granite Water Company, Docket No. 2019-290-WS, Rate of Return, January 2020

Tennessee

- Limestone Water Utility Operating Company, Inc., Docket No. 24-00044, Rate of Return, December 2024
- Tennessee American Water Company, Inc., Docket No. 24-00032, Rate of Return, September 2024
- Kingsport Power Company D/B/A AEP Appalachian Power, Docket No. 21-00107, Rate of Return, March 2022

Vermont

- Central Vermont Public Service Corp., Docket No. 7321, Rate of Return, September 2007

Wisconsin

- American Transmission Company, LLC, ITC, Midwest, LLC, Case No. 19-CV-3418, financial and regulatory analysis regarding requested temporary injunction to halt the construction in Wisconsin of the proposed Cardinal-Hickory Creek transmission line, October 2021

OVERALL COST OF CAPITAL
Aquarion Water Company of Connecticut

	<u>Ratios</u>		<u>Cost Rate</u>		<u>Weighted Cost Rate</u>
					[D]
Long-Term Debt	49.55%	[A]	4.54%	[B]	2.25%
Short-Term Debt	0.00%	[B]	0.00%	[B]	0.00%
Preferred Equity	0.00%	[B]	0.00%	[B]	0.00%
Common Equity	50.45%	[A]	8.03%	[C]	4.05%
	<u>100.00%</u>				<u>6.30%</u>

RECOMMENDED RANGES

	<u>Low</u>	<u>High</u>
Proxy Group Cost of Equity Range	7.46%	8.59%
Proxy Group Cost of Equity		8.03%

Based on RFC Capital Structure Recommendation

Capital Structure Risk Adjustment	[E]	0.00%
Adjusted Recommended Cost of Equity Range	7.46%	8.59%
Company Specific Cost of Equity Recommendation		8.03%
Cost of Capital Range	6.01%	6.59%

Based on Mr. Nowak's Capital Structure Recommendation

Capital Structure Risk Adjustment	[F]	-0.18%
Adjusted Recommended Cost of Equity Range	7.28%	8.42%
Company Specific Cost of Equity Recommendation		7.85%
Cost of Capital Range	6.04%	6.67%

Comprehensive Cost of Capital Range

Cost of Debt Range	4.54%	3.64%
Common Equity Ratio Range	50.45%	47.93%
Comprehensive Cost of Capital Range	6.01%	6.01%

Sources:

- [A] Recommendation based on Proxy Group capital structures
[B] Witness: D. Szabo / L. Teixeira, SCHEDULE D-1.0
[C] Company Specific Cost of Equity Recommendation based on RFC Capital Structure Recommendation
[D] Ratios times Cost Rate
[E] Not applicable because of recommended Capital Structure within Proxy Group range.
[F] Based on estimate of 0.04% change in Cost of Equity for each 1% difference in Common Equity Ratio compared to the Proxy Group (Exhibit ALR-1 vs. Exhibit ALR-5, page 4).

COST OF EQUITY SUMMARY

Nowak Proxy Group (11 Companies)

		Low	High	Percentile			
				50.0% (Median)	85.0%	87.5%	90.0%
DCF		6.83%	9.27%				
Constant Growth - Sustainable Growth	[A]	9.12%	9.27%				
Constant Growth - Option-Implied Growth	[B]	6.83%	7.33%				
Non-Constant Growth	[C]	7.07%	7.28%				
CAPM		5.95%	7.37%				
3-Mo. Weighted Average (Feb. to Apr. 2026)							
3-Month Treasury Bill Risk-Free Rate	[D]	6.12%	6.88%				
30-Year Treasury Bond Risk-Free Rate	[D]	6.77%	7.37%				
Spot (Apr. 30, 2026)							
3-Month Treasury Bill Risk-Free Rate	[E]	5.95%	6.65%				
30-Year Treasury Bond Risk-Free Rate	[E]	6.68%	7.21%				

Proxy Group Cost of Equity

6.98%	7.46%	8.03%	8.59%
Median of Overall	COE Recommendation		
Range of Results	<---- Recommended Range ---->		

Sources:

- [A] Exhibit ALR-3, page 1
- [B] Exhibit ALR-3, page 2
- [C] Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4
- [D] Exhibit ALR-4, page 1
- [E] Exhibit ALR-4, page 5

CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
Nowak Proxy Group (11 Companies)

		Based on Average Market Price For Year Ending 4/30/2026	Based On Market Price As Of 4/30/2026
1 Dividend Yield On Market Price	[A]	3.18%	2.99%
2 Retention Rate:			
a) Market-to-Book Ratio	[A]	1.81	1.85
b) Dividend Yield on Book	[B]	5.77%	5.55%
c) Expected Return on Equity	[C]	9.20%	9.20%
d) Retention Rate	[D]	37.32%	39.63%
3 Reinvestment Growth	[E]	3.43%	3.65%
4 New Financing Growth	[F]	2.41%	2.54%
5 Total Estimate of Investor Anticipated Growth	[G]	5.84%	6.19%
6 Increment to Dividend Yield for Growth to Next Year	[H]	0.09%	0.09%
7 Indicated Cost of Equity	[I]	9.12%	9.27%

Sources:

[A] Exhibit ALR-5, page 1

[B] Line 1 x Line 2a

[C] Some of the considerations for determining Future Expected Return on Equity:

	<u>Median</u>	<u>Mean</u>	<u>From</u>
Value Line Expectation	9.50%	10.00%	Exhibit ALR-5, page 2
Return on Equity to Achieve <u>Zacks</u> Growth	8.88%	9.06%	Exhibit ALR-5, page 3
Average Historical Growth	8.40%	9.17%	
Earned Return on Equity in 2025	8.44%	9.28%	Exhibit ALR-5, page 2
Earned Return on Equity in 2024	9.02%	9.47%	Exhibit ALR-5, page 2
Earned Return on Equity in 2023	7.75%	8.77%	Exhibit ALR-5, page 2

[D] 1 - Line 2b / Line 2c

[E] Line 2c x Line 2d

[F] $S \times V = (\text{Ext. Fin Rate}) \times (\text{Line 2a} - 1)$

Ext. Fin. Rate = 2.97%

From
Exhibit ALR-3, page 5

S = rate of continuous new stock financing

V = fraction of funds raised by sale of stock that increases the book value of existing shareholders' common equity

[G] Line 3 + Line 4

[H] Line 1 x one-half of Line 5

[I] Line 1 + Line 5 + Line 6

CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
Nowak Proxy Group (11 Companies)

		Based On Weighted Averages As Of 4/30/2026	Based On Spot Market Values As Of 4/30/2026
1 Dividend Yield On Market Price	[A]	3.18%	2.99%
2 Total Estimate of Investor Anticipated Growth	[B]	4.09%	3.78%
3 Increment to Dividend Yield for Growth to Next Year	[C]	0.07%	0.06%
4 Indicated Cost of Equity	[D]	7.33%	6.83%

Sources:

- [A] Exhibit ALR-5, page 1
- [B] 6-Month Option-Implied Growth
- [C] Line 1 x one-half of Line 2
- [D] Line 1 + Line 2 + Line 3

NON-CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
(BASED ON VALUE LINE FORECASTS AND CLOSING STOCK PRICE)
Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
		Forecasted Dividends per Share					Growth	Book Value		Closing Stock Price		Cash Flow From Buying and Selling Stock (At Closing Price)					
		2026	2027	2028	2029	2030	2027-30	4/30/26	4/30/30	4/30/2026	4/30/2030	2026	2027	2028	2029	2030	IRR / DCF
		[A]	[A]	[B]	[B]	[A]	[B]	[C]	[C]	[D]	[E]	[F]	[F]	[F]	[F]	[F]	[G]
AMER. STATES WATER	AWR	\$2.10	\$2.28	\$2.46	\$2.65	\$2.85	7.72%	\$27.22	\$32.63	\$74.79	\$89.67	(\$73.21)	\$2.28	\$2.46	\$2.65	\$90.38	7.82%
ATMOS ENERGY CORP.	ATO	\$4.00	\$4.24	\$4.49	\$4.76	\$5.05	6.00%	\$85.17	\$107.79	\$189.98	\$240.45	(\$186.98)	\$4.24	\$4.49	\$4.76	\$241.72	8.33%
CALIFORNIA WATER	CWT	\$1.34	\$1.38	\$1.43	\$1.49	\$1.55	3.95%	\$29.41	\$37.61	\$41.91	\$53.61	(\$40.91)	\$1.38	\$1.43	\$1.49	\$53.99	9.67%
H2O AMERICA	HTO	\$1.75	\$1.82	\$1.86	\$1.91	\$1.95	2.33%	\$41.16	\$54.01	\$55.76	\$73.18	(\$54.45)	\$1.82	\$1.86	\$1.91	\$73.67	10.26%
MIDDLESEX WATER	MSEX	\$1.46	\$1.52	\$1.56	\$1.61	\$1.65	2.77%	\$27.06	\$28.61	\$50.53	\$53.43	(\$49.43)	\$1.52	\$1.56	\$1.61	\$53.84	4.51%
NEW JERSEY RES.	NJR	\$1.90	\$2.10	\$2.20	\$2.30	\$2.40	4.55%	\$24.25	\$30.46	\$56.31	\$70.75	(\$54.89)	\$2.10	\$2.20	\$2.30	\$71.35	9.63%
NI SOURCE INC.	NI	\$1.20	\$1.28	\$1.36	\$1.44	\$1.52	5.90%	\$25.78	\$31.63	\$48.28	\$59.25	(\$47.38)	\$1.28	\$1.36	\$1.44	\$59.63	7.96%
N.W. NATURAL	NWN	\$1.97	\$1.97	\$1.98	\$1.99	\$2.00	0.51%	\$34.91	\$37.94	\$53.00	\$57.61	(\$51.52)	\$1.97	\$1.98	\$1.99	\$58.11	5.89%
ONE GAS, INC.	OGS	\$2.72	\$2.76	\$2.82	\$2.89	\$2.95	2.24%	\$53.95	\$52.96	\$88.48	\$86.86	(\$86.44)	\$2.76	\$2.82	\$2.89	\$87.60	2.80%
SOUTHWEST GAS	SWX	\$2.48	\$2.48	\$2.55	\$2.62	\$2.70	2.87%	\$54.81	\$62.85	\$93.37	\$107.07	(\$91.51)	\$2.48	\$2.55	\$2.62	\$107.75	6.19%
SPIRE INC.	SR	\$3.30	\$3.46	\$3.63	\$3.81	\$4.00	4.95%	\$52.99	\$54.51	\$91.18	\$93.80	(\$88.71)	\$3.46	\$3.63	\$3.81	\$94.80	4.74%
Maximum		\$4.00	\$4.24	\$4.49	\$4.76	\$5.05	7.72%	\$85.17	\$107.79	\$189.98	\$240.45	(\$40.91)	\$4.24	\$4.49	\$4.76	\$241.72	10.26%
Minimum		\$1.20	\$1.28	\$1.36	\$1.44	\$1.52	0.51%	\$24.25	\$28.61	\$41.91	\$53.43	(\$186.98)	\$1.28	\$1.36	\$1.44	\$53.84	2.80%
Median		\$1.97	\$2.10	\$2.20	\$2.30	\$2.40	3.95%	\$34.91	\$37.94	\$56.31	\$73.18	(\$54.89)	\$2.10	\$2.20	\$2.30	\$73.67	7.82%
Average		\$2.20	\$2.30	\$2.40	\$2.50	\$2.60	3.98%	\$41.52	\$48.27	\$76.69	\$89.61	(\$75.04)	\$2.30	\$2.40	\$2.50	\$90.26	7.07%

Sources:

- [A] Value Line: Most current data available at time of schedule preparation. 2030 data is VL forecast for 2029-31.
- [B] Straight line interpolation based on Value Line data, assuming constant dividend growth for 2027-30.
- [C] Straight line interpolation based on Value Line data, assuming constant book value growth for 2027-30.
- [D] EOD Data: Market Data as of April 30, 2026.
- [E] Stock Price projected assuming constant Market to Book Ratio (Exhibit ALR-5, page 1) and using VL projected Book Value.
- [F] Cash Flow from purchasing stock on May 1, 2026, receiving dividends through 2030, and selling on April 30, 2030.
- Negative number in 2026 reflects cash outflow required to purchase stock.
- Cash flow sources are 1) dividends and 2) proceeds of stock sale.
- 3 of 4 dividends assumed received in 2026 and 1 of 4 in 2030 based on purchase and sale date.
- [G] Total return on equity to investor who purchased, held, and sold stock as described above,
- assuming Value Line projections of Dividends and Book Value are correct and
- assuming Stock Price grows at same rate as Book Value.
- DCF result is an Internal Rate of Return computation made using the "IRR" function built into Microsoft Excel based on projected cash flows from 2026 to 2030.

NON-CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
(BASED ON VALUE LINE FORECASTS AND LTM AVERAGE STOCK PRICE)
Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
		Forecasted Dividends per Share					Growth	LTM Avg. Book Value		LTM Avg. Stock Price		Cash Flow From Buying and Selling Stock (At LTM Average Price)					
		2026	2027	2028	2029	2030	2027-30	2026	2030	4/30/26	4/30/30	2026	2027	2028	2029	2030	IRR / DCF
		[A]	[A]	[B]	[B]	[A]	[B]	[C]	[C]	[D]	[E]	[F]	[F]	[F]	[F]	[F]	[G]
AMER. STATES WATER	AWR	\$2.10	\$2.28	\$2.46	\$2.65	\$2.85	7.72%	\$26.10	\$31.30	\$76.20	\$91.35	(\$74.62)	\$2.28	\$2.46	\$2.65	\$92.07	7.76%
ATMOS ENERGY CORP.	ATO	\$4.00	\$4.24	\$4.49	\$4.76	\$5.05	6.00%	\$82.66	\$104.63	\$171.25	\$216.74	(\$168.25)	\$4.24	\$4.49	\$4.76	\$218.00	8.59%
CALIFORNIA WATER	CWT	\$1.34	\$1.38	\$1.43	\$1.49	\$1.55	3.95%	\$28.59	\$36.56	\$46.22	\$59.11	(\$45.22)	\$1.38	\$1.43	\$1.49	\$59.50	9.35%
H2O AMERICA	HTO	\$1.75	\$1.82	\$1.86	\$1.91	\$1.95	2.33%	\$41.23	\$54.11	\$52.81	\$69.30	(\$51.50)	\$1.82	\$1.86	\$1.91	\$69.79	10.44%
MIDDLESEX WATER	MSEX	\$1.46	\$1.52	\$1.56	\$1.61	\$1.65	2.77%	\$26.27	\$27.78	\$53.87	\$56.96	(\$52.78)	\$1.52	\$1.56	\$1.61	\$57.38	4.31%
NEW JERSEY RES.	NJR	\$1.90	\$2.10	\$2.20	\$2.30	\$2.40	4.55%	\$23.46	\$29.48	\$50.58	\$63.55	(\$49.16)	\$2.10	\$2.20	\$2.30	\$64.15	10.07%
NI SOURCE INC.	NI	\$1.20	\$1.28	\$1.36	\$1.44	\$1.52	5.90%	\$23.33	\$28.64	\$43.07	\$52.85	(\$42.17)	\$1.28	\$1.36	\$1.44	\$53.23	8.30%
N.W. NATURAL	NWN	\$1.97	\$1.97	\$1.98	\$1.99	\$2.00	0.51%	\$34.64	\$37.65	\$47.55	\$51.68	(\$46.07)	\$1.97	\$1.98	\$1.99	\$52.18	6.34%
ONE GAS, INC.	OGS	\$2.72	\$2.76	\$2.82	\$2.89	\$2.95	2.24%	\$53.20	\$52.22	\$80.83	\$79.34	(\$78.79)	\$2.76	\$2.82	\$2.89	\$80.08	3.12%
SOUTHWEST GAS	SWX	\$2.48	\$2.48	\$2.55	\$2.62	\$2.70	2.87%	\$52.75	\$60.48	\$80.67	\$92.51	(\$78.81)	\$2.48	\$2.55	\$2.62	\$93.18	6.63%
SPIRE INC.	SR	\$3.30	\$3.46	\$3.63	\$3.81	\$4.00	4.95%	\$52.66	\$54.17	\$82.63	\$85.00	(\$80.15)	\$3.46	\$3.63	\$3.81	\$86.00	5.17%
Maximum		\$4.00	\$4.24	\$4.49	\$4.76	\$5.05	7.72%	\$82.66	\$104.63	\$171.25	\$216.74	(\$42.17)	\$4.24	\$4.49	\$4.76	\$218.00	10.44%
Minimum		\$1.20	\$1.28	\$1.36	\$1.44	\$1.52	0.51%	\$23.33	\$27.78	\$43.07	\$51.68	(\$168.25)	\$1.28	\$1.36	\$1.44	\$52.18	3.12%
Median		\$1.97	\$2.10	\$2.20	\$2.30	\$2.40	3.95%	\$34.64	\$37.65	\$53.87	\$69.30	(\$52.78)	\$2.10	\$2.20	\$2.30	\$69.79	7.76%
Average		\$2.20	\$2.30	\$2.40	\$2.50	\$2.60	3.98%	\$40.45	\$47.00	\$71.42	\$83.49	(\$69.77)	\$2.30	\$2.40	\$2.50	\$84.14	7.28%

Sources:

- [A] Value Line: Most current data available at time of schedule preparation. 2030 data is VL forecast for 2029-31.
[B] Straight line interpolation based on Value Line data, assuming constant dividend growth for 2027-30.
[C] Straight line interpolation based on Value Line data, assuming constant book value growth for 2027-30.
[D] EOD Data: Market Data as of April 30, 2026.
[E] Stock Price projected assuming constant Market to Book Ratio (Exhibit ALR-5, page 1) and using VL projected Book Value.
[F] Cash Flow from purchasing stock on May 1, 2026, receiving dividends through 2030, and selling on April 30, 2030.
Negative number in 2026 reflects cash outflow required to purchase stock.
Cash flow sources are 1) dividends and 2) proceeds of stock sale.
3 of 4 dividends assumed received in 2026 and 1 of 4 in 2030 based on purchase and sale date.
[G] Total return on equity to investor who purchased, held, and sold stock as described above,
assuming Value Line projections of Dividends and Book Value are correct and
assuming Stock Price grows at same rate as Book Value.
DCF result is an Internal Rate of Return computation made using the "IRR" function built into Microsoft Excel
based on projected cash flows from 2026 to 2030.

COMMON SHARES OUTSTANDING AND EXTERNAL FINANCING RATE
Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
		Common Stock Outstanding (Millions of Shares)								Annual Growth Rate		
		2021	2022	2023	2024	2025	2026	2027	2030	2021-25	2025-30	2021-30
		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[B]	[B]	[B]
AMER. STATES WATER	AWR	36.9	36.9	37.0	37.0	38.2	39.1	39.3	40.0	0.84%	0.95%	0.90%
ATMOS ENERGY CORP.	ATO	125.9	132.4	140.9	148.5	155.3	161.6	171.0	200.0	5.38%	5.19%	5.28%
CALIFORNIA WATER	CWT	50.3	53.7	55.6	57.7	59.5	59.6	60.0	60.0	4.26%	0.17%	1.97%
H2O AMERICA	HTO	28.6	30.2	30.8	32.0	33.6	36.1	42.0	35.0	4.17%	0.80%	2.29%
MIDDLESEX WATER	MSEX	17.5	17.5	17.6	17.8	17.9	18.5	18.5	18.8	0.60%	0.94%	0.79%
NEW JERSEY RES.	NJR	95.8	95.0	96.3	97.6	99.5	100.5	102.0	105.0	0.94%	1.09%	1.02%
NI SOURCE INC.	NI	391.8	405.3	412.1	447.4	469.8	478.4	500.0	525.0	4.65%	2.25%	3.31%
N.W. NATURAL	NWN	30.6	31.1	35.5	37.6	40.2	42.0	45.0	50.0	7.08%	4.45%	5.61%
ONE GAS, INC.	OGS	53.2	53.6	55.4	56.6	59.9	60.0	62.0	75.0	3.02%	4.61%	3.90%
SOUTHWEST GAS	SWX	57.2	60.4	67.1	71.6	71.8	73.0	74.0	77.0	5.85%	1.41%	3.36%
SPIRE INC.	SR	51.6	51.7	52.5	53.2	57.7	59.0	62.0	75.0	2.83%	5.38%	4.24%
Maximum		391.8	405.3	412.1	447.4	469.8	478.4	500.0	525.0	7.08%	5.38%	5.61%
Minimum		17.5	17.5	17.6	17.8	17.9	18.5	18.5	18.8	0.60%	0.17%	0.79%
Median		51.6	53.6	55.4	56.6	59.5	59.6	62.0	75.0	4.17%	1.41%	3.31%
Average		85.4	88.0	91.0	96.1	100.3	102.5	106.9	114.6	3.60%	2.48%	2.97%
Sustainable Growth [C]											2.97%	

Sources:

[A] Value Line: Most current data available at time of schedule preparation

[B] Annualized Growth Rate calculation.

[C] Estimated Sustainable Growth in Common Stock based on analysis of historical and projected growth rates

CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY

WEIGHTED - All Inputs Weighted From February to April 2026
Nowak Proxy Group

	<u>3-Month Treasury Bill</u>		<u>30-Year Treasury Bond</u>	
	<u>Historical Blended Beta</u>	<u>Forward Beta</u>	<u>Historical Blended Beta</u>	<u>Forward Beta</u>
Risk-Free Rate	3.68%	3.68%	4.86%	4.86%
Beta	0.44	0.58	0.44	0.58
Risk Premium	5.48%	5.48%	4.30%	4.30%
CAPM (Weighted)	6.12%	6.88%	6.77%	7.37%

CAPITAL ASSET PRICING MODEL (CAPM) - RISK-FREE RATE

Spot (Apr. 30, 2026)

3-Month Treasury Bill	3.68%
30-Year Treasury Bond	4.98%

3-Mo. Weighted Average (Feb. to Apr. 2026)

3-Month Treasury Bill	3.68%
30-Year Treasury Bond	4.86%

Source: www.treasury.gov

CAPITAL ASSET PRICING MODEL (CAPM) - BETAS
 (BASED ON HISTORICAL AND OPTION-IMPLIED RETURNS)
 Nowak Proxy Group

Betas	01/27/2026	02/03/2026	02/10/2026	02/17/2026	02/24/2026	03/03/2026	03/10/2026	03/17/2026	03/24/2026	03/31/2026	04/07/2026	04/14/2026	04/21/2026	04/28/2026	Average	Time Avg.
Forward (6 months)	0.81	0.75	0.73	0.67	0.58	0.63	0.55	0.58	0.52	0.53	0.56	0.59	0.58	0.57	0.618	0.583
Historical (6 months)	0.44	0.40	0.36	0.32	0.30	0.31	0.31	0.33	0.39	0.36	0.39	0.37	0.35	0.34	0.355	0.351
Historical (2 yrs)	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.45	0.45	0.473	0.467
Historical (5 yrs)	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.642	0.639
Weighting																
Forward (6 months)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%		
Historical (6 months)	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%		
Historical (2 yrs)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%		
Historical (5 yrs)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%		
Historical Blended Beta	0.49	0.48	0.46	0.43	0.42	0.42	0.43	0.44	0.47	0.45	0.46	0.45	0.44	0.43	0.448	0.443
Slope	15%															
Points	0.00	1.00	1.15	1.32	1.52	1.75	2.01	2.31	2.66	3.06	3.52	4.05	4.65	5.35		
Time Weight	0.0%	2.9%	3.3%	3.8%	4.4%	5.1%	5.9%	6.7%	7.7%	8.9%	10.2%	11.8%	13.5%	15.6%		

CAPM Betas	Spot (Apr 28, 2026)	Weighted (Feb - Apr 2026)
Forward	0.57	0.58
Historical Blended	0.43	0.44

Note: Historical betas are calculated on Tuesdays, following Value Line's methodology. Forward (option-implied) betas are also calculated on Tuesdays for the sake of compatibility.

CAPITAL ASSET PRICING MODEL (CAPM) - MARKET RISK PREMIUM

WEIGHTED - All Inputs Weighted From February to April 2026

Cumulative Probability	50.00%		
S&P 500 Option-Implied Growth Rate	8.00%		
S&P 500 Dividend Yield	1.17%		
S&P 500 Market Return	9.17%		
	<u>3-Month Treasury Bill</u>	<u>30-Year Treasury Bond</u>	
Risk-Free Rate	3.68%	4.86%	
Option-Implied Market Risk Premium (Weighted)	5.48%	4.30%	

CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY

SPOT - All Inputs Based on Last Available Data as of April 30, 2026

Nowak Proxy Group

	3-Month Treasury Bill		30-Year Treasury Bond	
	<u>Historical Blended Beta</u>	<u>Forward Beta</u>	<u>Historical Blended Beta</u>	<u>Forward Beta</u>
Risk-Free Rate	3.68%	3.68%	4.98%	4.98%
Beta	0.43	0.57	0.43	0.57
Risk Premium	5.24%	5.24%	3.94%	3.94%
CAPM (Spot)	5.95%	6.65%	6.68%	7.21%

CAPITAL ASSET PRICING MODEL (CAPM) - MARKET RISK PREMIUM

SPOT - All Inputs Based on Last Available Data as of April 30, 2026

Cumulative Probability	50.00%	
S&P 500 Option-Implied Growth Rate	7.73%	
S&P 500 Dividend Yield	1.19%	
S&P 500 Market Return	8.92%	
	<u>3-Month Treasury Bill</u>	<u>30-Year Treasury Bond</u>
Risk-Free Rate	3.68%	4.98%
Option-Implied Market Risk Premium (Spot)	5.24%	3.94%

MARKET TO BOOK RATIO AND DIVIDEND YIELD

Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
		Book Value per Share							Market Price			Mkt. to Book Ratio		Dividend Rate		Dividend Yield	
		Actual			Estimated												
		12/31/22	12/31/23	12/31/24	12/31/25	4/30/25	4/30/26	12/31/26	4/30/26	LTM High	LTM Low	4/30/26	LTM Avg.	MRQ	Annual	4/30/26	LTM Avg.
		[A]	[A]	[A]	[A]	[B]	[B]	[A]	[C]	[C]	[C]	[D]	[D]	[A]	[E]	[F]	[F]
AMER. STATES WATER	AWR	\$19.20	\$20.99	\$24.12	\$26.76	\$24.99	\$27.22	\$28.15	\$74.79	\$82.94	\$69.45	2.75	2.92	\$0.504	\$2.016	2.70%	2.65%
ATMOS ENERGY CORP.	ATO	\$66.85	\$73.20	\$78.31	\$83.92	\$80.16	\$85.17	\$87.70	\$189.98	\$192.51	\$149.98	2.23	2.07	\$1.000	\$4.000	2.11%	2.34%
CALIFORNIA WATER	CWT	\$23.70	\$24.72	\$27.49	\$28.35	\$27.77	\$29.41	\$31.55	\$41.91	\$51.15	\$41.29	1.43	1.62	\$0.335	\$1.340	3.20%	2.90%
H2O AMERICA	HTO	\$36.06	\$38.52	\$40.65	\$42.66	\$41.31	\$41.16	\$38.10	\$55.76	\$61.87	\$43.75	1.35	1.28	\$0.440	\$1.760	3.16%	3.33%
MIDDLESEX WATER	MSEX	\$22.65	\$23.74	\$24.89	\$26.67	\$25.48	\$27.06	\$27.85	\$50.53	\$63.57	\$44.17	1.87	2.05	\$0.360	\$1.440	2.85%	2.67%
NEW JERSEY RES.	NJR	\$18.88	\$20.40	\$22.12	\$23.80	\$22.67	\$24.25	\$25.15	\$56.31	\$57.70	\$43.46	2.32	2.16	\$0.475	\$1.900	3.37%	3.76%
NI SOURCE INC.	NI	\$14.63	\$17.40	\$18.48	\$25.79	\$20.89	\$25.78	\$25.75	\$48.28	\$48.92	\$37.22	1.87	1.85	\$0.300	\$1.200	2.49%	2.79%
N.W. NATURAL	NWN	\$33.09	\$34.12	\$34.44	\$34.25	\$34.38	\$34.91	\$36.25	\$53.00	\$55.99	\$39.10	1.52	1.37	\$0.493	\$1.972	3.72%	4.15%
ONE GAS, INC.	OGS	\$46.69	\$48.91	\$51.85	\$53.65	\$52.44	\$53.95	\$54.55	\$88.48	\$90.78	\$70.87	1.64	1.52	\$0.680	\$2.720	3.07%	3.37%
SOUTHWEST GAS	SWX	\$45.57	\$46.25	\$48.82	\$54.45	\$50.68	\$54.81	\$55.55	\$93.37	\$94.41	\$66.93	1.70	1.53	\$0.620	\$2.480	2.66%	3.07%
SPIRE INC.	SR	\$49.08	\$50.29	\$51.83	\$53.35	\$52.33	\$52.99	\$52.25	\$91.18	\$95.31	\$69.94	1.72	1.57	\$0.825	\$3.300	3.62%	3.99%
Maximum		\$66.85	\$73.20	\$78.31	\$83.92	\$80.16	\$85.17	\$87.70	\$189.98	\$192.51	\$149.98	2.75	2.92	\$1.000	\$4.000	3.72%	4.15%
Minimum		\$14.63	\$17.40	\$18.48	\$23.80	\$20.89	\$24.25	\$25.15	\$41.91	\$48.92	\$37.22	1.35	1.28	\$0.300	\$1.200	2.11%	2.34%
Median		\$33.09	\$34.12	\$34.44	\$34.25	\$34.38	\$34.91	\$36.25	\$56.31	\$63.57	\$44.17	1.72	1.62	\$0.493	\$1.972	3.07%	3.07%
Average		\$34.22	\$36.23	\$38.45	\$41.24	\$39.37	\$41.52	\$42.08	\$76.69	\$81.38	\$61.47	1.85	1.81	\$0.548	\$2.193	2.99%	3.18%

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Straight-line interpolation of Actual and Estimated VL year-end values.

[C] EOD Data: Market Data as of April 30, 2026.

[D] Market Price divided by Book Value per Share.

[E] Most Recent Quarterly Dividend multiplied by 4.

[F] Dividend Rate divided by Market Price.

EARNINGS PER SHARE AND RETURN ON EQUITY
Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
		Earnings per Share				Return on Equity			
		2022	2023	2024	2025	2023	2024	2025	VL Future Exp.
		[A]	[A]	[A]	[A]	[B]	[B]	[B]	[A]
AMER. STATES WATER	AWR	\$2.11	\$3.36	\$3.17	\$3.37	16.72%	14.05%	13.25%	13.50%
ATMOS ENERGY CORP.	ATO	\$5.60	\$6.10	\$6.83	\$7.46	8.71%	9.02%	9.20%	9.50%
CALIFORNIA WATER	CWT	\$1.77	\$0.91	\$3.26	\$2.15	3.76%	12.49%	7.70%	7.50%
H2O AMERICA	HTO	\$2.43	\$2.68	\$2.87	\$2.99	7.19%	7.25%	7.18%	7.50%
MIDDLESEX WATER	MSEX	\$2.39	\$1.76	\$2.47	\$2.36	7.59%	10.16%	9.15%	11.00%
NEW JERSEY RES.	NJR	\$2.50	\$2.71	\$2.92	\$3.33	13.80%	13.73%	14.50%	12.50%
NI SOURCE INC.	NI	\$1.47	\$1.60	\$1.75	\$1.95	9.99%	9.75%	8.81%	8.00%
N.W. NATURAL	NWN	\$2.54	\$2.59	\$2.03	\$2.90	7.71%	5.92%	8.44%	8.00%
ONE GAS, INC.	OGS	\$4.08	\$4.14	\$3.91	\$4.37	8.66%	7.76%	8.28%	11.00%
SOUTHWEST GAS	SWX	(\$3.10)	\$2.13	\$2.76	\$3.65	4.64%	5.81%	7.07%	9.00%
SPIRE INC.	SR	\$3.95	\$3.85	\$4.19	\$4.44	7.75%	8.21%	8.44%	12.50%
Maximum		\$5.60	\$6.10	\$6.83	\$7.46	16.72%	14.05%	14.50%	13.50%
Minimum		(\$3.10)	\$0.91	\$1.75	\$1.95	3.76%	5.81%	7.07%	7.50%
Median		\$2.43	\$2.68	\$2.92	\$3.33	7.75%	9.02%	8.44%	9.50%
Average		\$2.34	\$2.89	\$3.29	\$3.54	8.77%	9.47%	9.28%	10.00%

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Earnings per Share divided by average Book Value. Book Values shown on Exhibit ALR-5, page 1.

RETURN ON EQUITY IMPLIED BY ZACKS GROWTH RATES

Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
		Book Value	EPS	Annual Dividend	Analyst 5 Year	Analyst-Implied Book Value before SV		Analyst-Implied Book Value Incl. SV		Implied EPS	Analyst-Implied
		12/31/25	2025	Rate	Growth Rate	12/31/2029	12/31/2030	12/31/2029	12/31/2030	2030	ROE
		[A]	[A]	[A]	[B]	[C]	[C]	[C]	[C]	[C]	[C]
AMER. STATES WATER	AWR	\$26.76	\$3.37	\$2.016	6.90%	\$33.18	\$35.07	\$34.94	\$37.41	\$4.70	13.00%
ATMOS ENERGY CORP.	ATO	\$83.92	\$7.46	\$4.000	6.80%	\$100.28	\$105.09	\$141.08	\$161.02	\$10.37	6.86%
CALIFORNIA WATER	CWT	\$28.35	\$2.15	\$1.340	10.60%	\$32.54	\$33.89	\$32.54	\$33.89	\$3.56	10.71%
H2O AMERICA	HTO	\$42.66	\$2.99	\$1.760	3.30%	\$48.00	\$49.45	\$37.42	\$36.22	\$3.52	9.55%
MIDDLESEX WATER	MSEX	\$26.67	\$2.36	\$1.440	NA	NA	NA	NA	NA	NA	NA
NEW JERSEY RES.	NJR	\$23.80	\$3.33	\$1.900	NA	NA	NA	NA	NA	NA	NA
NI SOURCE INC.	NI	\$25.79	\$1.95	\$1.200	6.10%	\$29.28	\$30.28	\$32.06	\$33.93	\$2.62	7.95%
N.W. NATURAL	NWN	\$34.25	\$2.90	\$1.972	NA	NA	NA	NA	NA	NA	NA
ONE GAS, INC.	OGS	\$53.65	\$4.37	\$2.720	6.20%	\$61.34	\$63.57	\$83.43	\$93.38	\$5.90	6.68%
SOUTHWEST GAS	SWX	\$54.45	\$3.65	\$2.480	9.90%	\$60.41	\$62.28	\$64.62	\$67.76	\$5.85	8.84%
SPIRE INC.	SR	\$53.35	\$4.44	\$3.300	11.80%	\$59.42	\$61.41	\$82.01	\$91.87	\$7.76	8.92%
Maximum		\$83.92	\$7.46	\$4.000	11.80%	\$100.28	\$105.09	\$141.08	\$161.02	\$10.37	13.00%
Minimum		\$23.80	\$1.95	\$1.200	3.30%	\$29.28	\$30.28	\$32.06	\$33.89	\$2.62	6.68%
Median		\$34.25	\$3.33	\$1.972	6.85%	\$53.71	\$55.43	\$51.02	\$52.59	\$5.28	8.88%
Average		\$41.24	\$3.54	\$2.193	7.70%	\$53.06	\$55.13	\$63.51	\$69.43	\$5.53	9.06%

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Zacks: Data as of May 19, 2026.

[C] Analyst-Implied Book Value and Return on Equity is obtained by escalating both Dividends and Earnings per Share by the stated Analyst Growth Rate and adding Earnings and subtracting Dividends for each projected year.

"SV" = $S \times V$, where S = rate of continuous new stock financing and V = rate of return on common equity investment.

CAPITAL STRUCTURE WITH SHORT TERM DEBT
Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
		% Common Equity					(\$ millions)						Percentage			
		2021	2022	2023	2024	2025	Total Debt	LT Debt	ST Debt	Pfd Stock	Equity	Total Capital	LT Debt	ST Debt	Pfd Stock	Equity Ratio
		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[B]	[B]	[B]	[B]
AMER. STATES WATER	AWR	53.9%	60.1%	47.2%	53.3%	57.0%	\$ 790.9	\$ 782.7	\$ 8.2	\$ -	\$ 1,037.5	\$ 1,828.4	42.8%	0.4%	0.0%	56.7%
ATMOS ENERGY CORP.	ATO	61.6%	62.1%	62.1%	60.7%	60.2%	\$ 9,632.8	\$ 9,621.8	\$ 11.0	\$ -	\$ 14,553.6	\$ 24,186.4	39.8%	0.0%	0.0%	60.2%
CALIFORNIA WATER	CWT	52.7%	55.6%	57.5%	59.7%	53.5%	\$ 1,604.3	\$ 1,472.0	\$ 132.3	\$ -	\$ 1,693.6	\$ 3,297.9	44.6%	4.0%	0.0%	51.4%
H2O AMERICA	HTO	40.9%	42.7%	44.7%	44.5%	45.2%	\$ 1,977.1	\$ 1,866.8	\$ 110.3	\$ -	\$ 1,539.8	\$ 3,516.9	53.1%	3.1%	0.0%	43.8%
MIDDLESEX WATER	MSEX	54.4%	57.7%	54.0%	55.7%	56.4%	\$ 417.4	\$ 380.7	\$ 36.7	\$ 2.4	\$ 495.6	\$ 915.4	41.6%	4.0%	0.3%	54.1%
NEW JERSEY RES.	NJR	43.0%	42.2%	41.8%	43.3%	42.5%	\$ 3,804.7	\$ 3,274.1	\$ 530.6	\$ -	\$ 2,420.0	\$ 6,224.7	52.6%	8.5%	0.0%	38.9%
NI SOURCE INC.	NI	33.5%	35.3%	40.3%	41.8%	46.0%	\$ 16,303.0	\$ 15,547.0	\$ 756.0	\$ -	\$ 13,243.7	\$ 29,546.7	52.6%	2.6%	0.0%	44.8%
N.W. NATURAL	NWN	47.2%	48.5%	47.4%	45.2%	45.0%	\$ 2,439.0	\$ 2,128.0	\$ 311.0	\$ -	\$ 1,741.1	\$ 4,180.1	50.9%	7.4%	0.0%	41.7%
ONE GAS, INC.	OGS	38.9%	49.3%	56.1%	56.5%	57.5%	\$ 3,400.2	\$ 2,355.6	\$ 1,044.6	\$ -	\$ 3,187.0	\$ 6,587.2	35.8%	15.9%	0.0%	48.4%
SOUTHWEST GAS	SWX	41.8%	41.0%	41.8%	44.6%	45.0%	\$ 3,507.1	\$ 3,507.1	\$ -	\$ -	\$ 2,869.4	\$ 6,376.5	55.0%	0.0%	0.0%	45.0%
SPIRE INC.	SR	43.2%	44.6%	41.3%	43.1%	46.6%	\$ 5,349.5	\$ 4,449.4	\$ 900.1	\$ 242.0	\$ 4,094.0	\$ 9,685.5	45.9%	9.3%	2.5%	42.3%
Maximum		61.6%	62.1%	62.1%	60.7%	60.2%	\$ 16,303.0	\$ 15,547.0	\$ 1,044.6	\$ 242.0	\$ 14,553.6	\$ 29,546.7	55.0%	15.9%	2.5%	60.2%
Minimum		33.5%	35.3%	40.3%	41.8%	42.5%	\$ 417.4	\$ 380.7	\$ -	\$ -	\$ 495.6	\$ 915.4	35.8%	0.0%	0.0%	38.9%
Median		43.2%	48.5%	47.2%	45.2%	46.6%	\$ 3,400.2	\$ 2,355.6	\$ 132.3	\$ -	\$ 2,420.0	\$ 6,224.7	45.9%	4.0%	0.0%	45.0%
Average		46.5%	49.0%	48.6%	49.9%	50.4%	\$ 4,475.1	\$ 4,125.9	\$ 349.2	\$ 22.2	\$ 4,261.4	\$ 8,758.7	46.8%	5.0%	0.3%	47.9%

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Percentage calculated on Total Capital including Short Term Debt.

CAPITAL STRUCTURE WITHOUT SHORT TERM DEBT
Nowak Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
		% Common Equity					(\$ millions)					Percentage				
		2021	2022	2023	2024	2025	Total Debt	LT Debt	ST Debt	Pfd Stock	Equity	Total Capital	LT Debt	ST Debt	Pfd Stock	Equity Ratio
		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[B]	[A]	[A]	[A]	[B]	[B]	[B]	[B]
AMER. STATES WATER	AWR	53.9%	60.1%	47.2%	53.3%	57.0%	\$ 790.9	\$ 782.7		\$ -	\$ 1,037.5	\$ 1,820.2	43.0%	0.0%	0.0%	57.0%
ATMOS ENERGY CORP.	ATO	61.6%	62.1%	62.1%	60.7%	60.2%	\$ 9,632.8	\$ 9,621.8		\$ -	\$ 14,553.6	\$ 24,175.4	39.8%	0.0%	0.0%	60.2%
CALIFORNIA WATER	CWT	52.7%	55.6%	57.5%	59.7%	53.5%	\$ 1,604.3	\$ 1,472.0		\$ -	\$ 1,693.6	\$ 3,165.6	46.5%	0.0%	0.0%	53.5%
H2O AMERICA	HTO	40.9%	42.7%	44.7%	44.5%	45.2%	\$ 1,977.1	\$ 1,866.8		\$ -	\$ 1,539.8	\$ 3,406.6	54.8%	0.0%	0.0%	45.2%
MIDDLESEX WATER	MSEX	54.4%	57.7%	54.0%	55.7%	56.4%	\$ 417.4	\$ 380.7		\$ 2.4	\$ 495.6	\$ 878.7	43.3%	0.0%	0.3%	56.4%
NEW JERSEY RES.	NJR	43.0%	42.2%	41.8%	43.3%	42.5%	\$ 3,804.7	\$ 3,274.1		\$ -	\$ 2,420.0	\$ 5,694.1	57.5%	0.0%	0.0%	42.5%
NI SOURCE INC.	NI	33.5%	35.3%	40.3%	41.8%	46.0%	\$ 16,303.0	\$ 15,547.0		\$ -	\$ 13,243.7	\$ 28,790.7	54.0%	0.0%	0.0%	46.0%
N.W. NATURAL	NWN	47.2%	48.5%	47.4%	45.2%	45.0%	\$ 2,439.0	\$ 2,128.0		\$ -	\$ 1,741.1	\$ 3,869.1	55.0%	0.0%	0.0%	45.0%
ONE GAS, INC.	OGS	38.9%	49.3%	56.1%	56.5%	57.5%	\$ 3,400.2	\$ 2,355.6		\$ -	\$ 3,187.0	\$ 5,542.6	42.5%	0.0%	0.0%	57.5%
SOUTHWEST GAS	SWX	41.8%	41.0%	41.8%	44.6%	45.0%	\$ 3,507.1	\$ 3,507.1		\$ -	\$ 2,869.4	\$ 6,376.5	55.0%	0.0%	0.0%	45.0%
SPIRE INC.	SR	43.2%	44.6%	41.3%	43.1%	46.6%	\$ 5,349.5	\$ 4,449.4		\$ 242.0	\$ 4,094.0	\$ 8,785.4	50.6%	0.0%	2.8%	46.6%
Maximum		61.6%	62.1%	62.1%	60.7%	60.2%	\$ 16,303.0	\$ 15,547.0		\$ 242.0	\$ 14,553.6	\$ 28,790.7	57.5%	0.0%	2.8%	60.2%
Minimum		33.5%	35.3%	40.3%	41.8%	42.5%	\$ 417.4	\$ 380.7		\$ -	\$ 495.6	\$ 878.7	39.8%	0.0%	0.0%	42.5%
Median		43.2%	48.5%	47.2%	45.2%	46.6%	\$ 3,400.2	\$ 2,355.6		\$ -	\$ 2,420.0	\$ 5,542.6	50.6%	0.0%	0.0%	46.6%
Average		46.5%	49.0%	48.6%	49.9%	50.4%	\$ 4,475.1	\$ 4,125.9		\$ 22.2	\$ 4,261.4	\$ 8,409.5	49.3%	0.0%	0.3%	50.4%

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Percentage calculated on Total Capital excluding Short Term Debt.